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POPULATION CHANGE IN ONTARIO TOWNS AND VILLAGES, 1961-81  
An Analysis of Some Influencing Factors

BY

YUANJIAN XIANG

A THESIS  
SUBMITTED TO THE  
FACULTY OF GRADUATE STUDIES AND RESEARCH  
THROUGH THE DEPARTMENT OF  
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OF THE REQUIREMENTS FOR THE DEGREE  
OF MASTER OF ARTS AT  
THE UNIVERSITY OF WINDSOR

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AUGUST 1988

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## ABSTRACT

### POPULATION CHANGE IN ONTARIO TOWNS AND VILLAGES, 1961-81

#### An Analysis of Some Influencing Factors

BY

Yuanjian Xiang

The purpose of this thesis is to analyze some factors which possibly influenced the population change in the Ontario towns and villages during the 1961-81 period. The role of the five influencing factors in the population change is analyzed. The factors include: (1) size of the nearest city; (2) distance from the towns and villages to that city; (3) size of the towns and villages; (4) occupational structure of the towns and villages; and (5) Ontario economic regions. Correlation and stepwise analyses are utilized and the results of the analyses are compared with Brozowski's (1971) study on the same subject but for two earlier decades. Then the thesis modifies some of those



factors and introduces two new factors, namely, unemployment rate and average income of the towns and villages, in order to improve the explanation of the population changes.

It is found that the size of the nearest city, the distance, and the economic regions are important factors during both decades of 1961-71 and 1971-81, while the size of the towns and villages and the occupational structure of these places are not important factors during the same period. The rôle of the influencing factors did not experience any fundamental change from the time period (1941-1966) covered by Brozowski. When the size of the nearest city and the distance factors are modified to form an urban shadow factor, which includes all the nearby cities instead of only one nearest city, this factor shows a strong correlation with the population growth of the towns and villages. Meanwhile, the unemployment rate and the average income factors are also found to have a significant relationship with the population changes.

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# ✓ POPULATION CHANGE IN ONTARIO TOWNS AND VILLAGES, 1961-1981:

## An Analysis of Some Influencing Factors

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### Chapter I

#### I. Introduction

Population Changes in rural vs urban areas and in small towns and villages have been of great concern to social scientists. Population changes in places, resulting from a variety of factors, -- socio-economic, organizational and technological as well as spatial -- are also a cause of several social, economic and planning problems. Geographers with their strong interest in spatial patterns of such changes have strongly been concerned with an analysis of several spatial factors such as distance, size, location, and economics in order to assess their role in the population changes.

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Population growth in Ontario slowed down during the two decades of 1961-71 and 1971-81 compared with the two previous ten year periods. During the four decades of 1941-81, Ontario population growth rate was highest during the 1951-61, then it continuously decreased in the following two decades. The growth rate in the 1970s dropped to only one



half of that in the previous decade. During the same period, the population growth in Ontario towns and villages<sup>1</sup> generally followed the provincial trend, although the rates of change were lower than the average for the province (see Table 1.1).

---

Table 1.1      Population Growth Rates of Ontario  
in the Four Decades

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	Growth		Rates	
	1941-51	1951-61	1961-71	1971-81
Ontario average (%)	21.4	35.6	23.5	12.0
Towns and Villages (%)	16.2	17.9	11.5	9.8

---

The table shows that the rates of population growth in Ontario towns and villages were always lower than those of the provincial average, but the difference in population growth rates between the two became smaller after the 1950s. The average population growth rates in Ontario and in the Ontario towns and villages were close to each other during the 1970s. This reflects the fact that more and more people

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1. The cities were those places whose population was over 10,000 and the towns and villages were those whose population was less than 10,000, as defined by Brozowski (1971) and Hodge and Gadeer (1983).

favoured towns and villages as their living places, compared with the previous decades.

This thesis attempts to analyze some factors that may have influenced population changes in Ontario towns and villages during the two decades of 1961-71 and 1971-81. An earlier study done by Brozowski focussed on the same problem during the 1941-66 period. Besides Brozowski's study, there were some other studies about population changes in North America such as Beale, 1982; Hodge and Qadeer, 1983; Lichter, Fuguitt and Heaton, 1985. However, most of the research on population changes in North America had focussed on cities, and not too many works had paid attention to the towns and villages, fewer still were attempts to analyze the relationship between recent population changes in the smaller places and the possible influencing factors. Population changes in towns and villages were still not fully understood and there was a need to do more research in this area. This kind of research could provide a basis for urban and regional planning. An understanding of the influencing factors behind the population changes could help planners to predict further population changes and achieve a more balanced economic development and population growth in the towns and villages.

Ontario has the largest number of towns and villages among all the provinces of Canada. It also has a great

internal physical, social and economic diversity. Thus, Ontario is a good region to study the population changes in the towns and villages. This thesis examines the population changes in Ontario towns and villages in order to further understand the relationship between these population changes and some influencing factors, and to discover if there had been any changes in the role of the influencing factors after the period covered by Brozowski's study. In order to compare with Brozowski's study, this thesis chooses the same influencing factors as Brozowski did, which included: size of places<sup>2</sup>, regional location of the places, occupational grouping of the places, size of the nearest city, and distance of the places to the nearest city. This thesis updates Brozowski's study to 1981. The time period of this thesis extends from 1961 to 1981 for two reasons: 1) it is meaningful to compare the latter two decades with the earlier two decades; 2) 1966 census data are not sufficient to serve as the beginning of the study period and 1986 census data were still not available. Brozowski used correlation and stepwise regression analyses to study the role of influencing factors. This thesis utilizes the same method in order to compare with Brozowski's study. The role of these factors, as in Brozowski's study, will be examined individually as well as collectively in order to assess

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2. here the places mean the Ontario towns and villages, this is the case in both Brozowski's study and this thesis.

their impact on the growth of small places. In addition, tabulations of data are presented to reinforce or supplement the correlation and stepwise regression analyses.

Besides using Brozowski's chosen factors, this thesis also modifies some of these factors and introduces some new factors in order to reveal more effectively the relationship between the population change and the influencing factors. The factors that were modified are the size of the nearest city, the distance of the towns and villages from that city, and the occupational structure of the towns and villages. The new factors consist of unemployment rate of the towns and villages and the average income of the places.

This thesis has five chapters. Chapter I presents an introduction to the scope and purpose of the study, a literature review, and a discussion of the methodology; Chapter II gives an analysis of population changes during the 1961-71 decade; and Chapter III is an analysis of population changes during the 1971-81 period. Chapter IV analyzes the population change during 1971-81 but with modified and new influencing factors. The last chapter presents a summary and brings out the main conclusions.

## II. Review of Literature

### 1. Review of the Studies on Population Changes in Recent Decades

This part of the literature review provides a general background of population changes in recent decades, showing that there existed different population change patterns over time during the recent periods. This change of population patterns through time would involve a possible change in the role of the influencing factors.

Morrill (1979,1980) summarized population changes of 1940-1976 in the USA into four periods: 1) central city in-migration, hinterland out-migration; 2) central city out-migration, suburban growth dominance, and rural hinterland out-migration; 3) central city and older suburban out-migration, far suburban and exurban in-migration; 4) metropolitan out-migration, exurban rural in-migration. He held that as urbanization progressed the economic and social costs were accumulated, and when the costs began to outweigh the benefits of concentration, decentralization occurred. Therefore, at present decentralization was going on in the most advanced areas, while other areas were still experiencing urbanization.

Ballard and Fuguitt (1985) suggested that the USA had gone through four stages from 1900 to 1980. 1900-1930 was characterized by continuous rural settlement and population

concentration; 1930-1940 was a period of depressed urban growth, 1940-1960 was a period of suburbanization and rural decline; 1960-1980 was decentralization and village revival. The periods between 1900-1930 and 1940-1960 experienced population concentration in urban centres and decline of small places, while during the 1930-1940 and 1960-1980 population growth of large places slowed down and the smaller places grew faster.

Phillips and Brunn (1978) held that America had entered a "slow Growth Epoch" since 1970, an epoch that was related to a decline of metropolitan regions and a shift in net in-migration to small cities and rural areas. The reason for the "rural renaissance" was related to increasing social security and other pension benefits, increasing income, and advanced transportation and communication. Beale (1982) also found that population growth in the USA experienced an unprecedented shift during the 1970s: 1) during 1970-1980 the population increase rate in nonmetropolitan areas was higher than that in metropolitan areas, while during the preceding decade the population increase rate was much lower in the nonmetropolitan areas; 2) during the 1960s the counties which were adjacent to a metropolitan area had only a moderate growth, while those that were not near a metropolitan area were stationary, but during the 1970s, both types of counties experienced great population increases.

Most of the studies about the new population trend were done in the USA. However, some Canadian literature also reveals that there was a similar situation in Canada as in the USA. While the large cities slowed their population growth in the recent years, the towns and villages sped up their growth.

Hodge and Qadeer (1983) identified five "apparently novel changes in the patterns of urbanization" in Canada in the 1970s. First, regional shifts in population: British Columbia and Alberta significantly expanded their share of the national population; while provinces in the eastern part of Canada grew at rates below the national average and some of them (including Ontario) experienced net out-migration. Second, regional shifts in employment, with employment going through the same regional shifts as the population. Third, declining metropolitan concentration, as the Canadian CMAs failed to increase their population by any appreciable amount in the 1970s for the first time since 1941, and the share of Canadian urban population accounted for by the three largest CMAs (Toronto, Montreal, and Vancouver) actually declined. Fourth, diminution of urban growth share: for the first time over one hundred years, the growth rate of urban population in Canada slowed to lower than the national average in 1971-1976 period, and this decline continued in the 1976-1981 period. Fifth, expanding metropolitan commuting fields: as Canada's cities expanded

their commuting fields, the metropolitan central cities grew at a rate below the Canadian average, but their suburbs grew at 2.5 times the national growth rate from 1971-1976.

Hodge and Qadeer also found that the population in Canadian towns and villages registered a growth rate of 25 percent during 1961-1981, while before 1961 their population hardly grew. Shaw (1985) pointed out three possible reasons for the phenomenon in which many people moved from the large cities to the smaller surrounding places in Canada in recent years: (1) lower tax rates on the land of the metropolitan fringe; (2) improved telecommunications leading to decentralization of business activities; and (3) improved commuter networks between non-CMA's places of residence and CMA's places of work.

## 2. Review of the Studies Dealing with some Influencing Factors in Population Changes in Towns and Village

While there are quite a few studies in recent years about the new population trend in North America, most of them offer a general description of population patterns or focus their attention on the population changes in metropolitan cities, while only a few of them deal with population changes in towns and villages. Thus, this part of the literature review has to retrace the studies of decades ago. This thesis presents a temporal review of the



literature, according to the individual influencing factors.

Since fertility and mortality across North America were basically uniform, the studies about population changes in its towns and villages mainly deal with people's migration. The factors influencing migration are also the factors influencing population changes in the towns and villages. The early migration theory based on the gravity model took into account two influencing factors in migration: population sizes of the two places (origin and destination places) and the distance between the two places. Large size places were believed to be positively related to the migration volume, while the distance would decrease the migration volume. These size and distance factors provide a basis for developing the urban shadow factor in the thesis. In addition, economic factors have long been established as the major reason for the migration. People generally moved from lower economic opportunity areas to the more prosperous areas, income and unemployment rate were thought to be the critical components among the economic factors (see Clark's literature review of internal migration, 1982). Other economic factors such as occupational structure of the places (Brozowski, 1971; and Tarver, 1972) and establishment of retail services in the places (Hasinger, 1957; Hodge, 1965; and Johansen and Fuguitt, 1979) also had a relationship with the population changes in the towns and villages. The importance of economic factors varied

spatially and temporally. Lewis (1982) held that economic factors were important in determining long distance migration, while social motives, such as family, housing, and slum clearance were more important in explaining short distance migration. Shaw (1985) believed that the importance of economic factors in explaining migration was related to the economic development level of the area, the more advanced the economy, the less important was the role of the economic factors.

In this part of the literature review, the influencing factors reviewed are: urban shadow, economic factors, regional location, and size of the towns and villages.

#### (1) Urban Shadow

The term urban shadow, adopted in Brozowski's study, refers to the influence of the city on the population changes in its nearby towns and villages. To measure the influence, both size of the city and distance from the city to the towns and villages should be considered. Among the earliest studies examining the importance of distance from major cities or trade centers were those by Lowry and Jacobson (1941) and Duncan and Reiss (1950). Lowry and Jacobson drew four zones around major trade centers in Minnesota with each zone five miles wide, and found that the small places in the inner zones had higher growth rates

than those in the outer zones. Duncan and Reiss had similar findings and they held that distance to the nearest city was a factor causing growth differences of the places in the USA.

Hassinger (1957) found that for the smaller centers (size less than 2,000) which were close to a larger centre of 2,000-4,999, the population growth beyond 10 miles was greater than population growth within 10 miles. However, if the larger centre's size was 5,000-25,000, the result was reversed. The reason suggested was that when the size difference of the two centers became larger, these two centers became functionally different, therefore they were less competitive. Butler and Fuguitt (1970) repeated Hassinger's study and found that Hassinger's pattern was duplicated in the Wisconsin farm region and in the remote northern Wisconsin region during 1940-1950. but in the more urbanized southeast during 1940-1950 and in all of Wisconsin during 1950-1960, the centre which was closer to the large centre had greater population growth. They suggested that the development of commuting to the large centers was a possible reason for this pattern.

Martin (1957) discussed the influence of the urban centre on its surrounding area in the USA. He held that this influence decreased with distance in a gradient. His gradient principle states: "The extent of urban-influenced changes in rural areas varies inversely with distance to the

nearest city and directly with the size of that city.". He listed eleven aspects of this influence, among them were deconcentration of population, deconcentration of industry and business activities, change of occupational composition in the surrounding area, change of land values and income in the surrounding area, etc. According to Martin's theory, the city would have direct and indirect influence on the population change of its surrounding area; the degree of the influence being dependent on the city's size and the distance from the surrounding places to this city. The gradient principle provided a measure for this influence.

Tarver and Beale (1968) studied population change in towns and villages in the South of the USA and found that the population gain decreased as the distance increased, but they also discovered through the use of multiple regression analysis that distance was not an important factor to explain the population change. Brozowski (1971), using the same method as Tarver and Beale, found that the distance to the nearest city was the most important factor to population change in Ontario towns and villages. The reason for the different results may be that all the Brozowski's towns and villages were limited within 30 miles of their nearest cities, while Tarver and Beale's towns and villages did not have any distance limit.

Fuguitt (1964) examined the population change of the villages around three different size cities (less than

10,000, 10,000 - 50,000, and greater than 50,000) and found that the villages around the larger size cities had greater population growth. Hodge and Gadeer (1983) held that in Canada the influence of a metropolis on the growth of the towns and villages mainly limited within 30 miles. The rate of population growth in the towns and villages within 30 miles of a metropolis was higher than that beyond 30 miles. However, for those towns and villages within a 30 mile distance, the places closer to the city did not have a faster population growth than those farther away from the city. Johansen and Fuguitt (1984) uncovered that in the USA the village population growth was negatively related to the distance to nearest large centers, and the difference between the population growth in villages at different distances became less and less apparent from 1950 to 1980. Joseph, Reddie, and Smit (1988) found that proximity to urban centres was a important factor in Canadian rural population upturn during the 1961-81 period. They suggested that much of the rural population growth was the result of "spillover" from urban centres.

## (2) Economic Factors

The past studies about the relationship of population change in towns and villages and the economic factors mainly fall into two categories: one, those dealing with the relationship between the population change in towns and

villages and the occupational (or industrial) structure in these places, and second, those that examine the relationship between the population change in towns and villages and the retail services of the places. The first kind of studies include those by Brunner (1951,1952), Brozowski (1971) and Tarver (1972). Brunner analyzed the relationship between the population change in the towns and villages in the USA and their economic foundations. He found that coal-mining towns and other one industry towns tended to decline while resort towns and towns on major transportation routes tended to grow.

Brozowski divided occupations of the Ontario towns and villages into three groups: primary, blue collar, and services. These three groups entered the multiple stepwise regression analysis as the three independent variables. The results showed that the relationship between the population change and the three occupational groups was not significant. The occupations had little influence on the population change of the towns and villages in the whole study period of 1941-1965.

Tarver (1972) analyzed the relationship between the population change in the American towns and their industrial structures during the 1950-1970 period. The towns were grouped into three major types: diversified towns, one-specialty towns, and multiple-specialty towns. His study indicated that the multiple-specialty towns had the

highest rates of population growth; one-specialty towns had the second highest rates in population growth during the 1960-1970 decade, but diversified towns had the second highest rates during the 1950-1960 decade. Within the one-specialty towns three subtypes of towns had fastest growth rates during the 1950-1971 decade, namely, those with specialization in professional, public administration, and wholesale-retail trade; three subtypes of towns' growth rates declined during the 1960-1970 decade as compared to the 1950-1960 decade; these were the towns with specialization in agricultural, manufacturing, and construction. The growth rates of mining towns and transportation towns were the lowest during the 1950-1970 period.

A problem arises in the use of occupational (or industrial) structures of the places as an influencing factor in relation to the population change of the places. Since all the study towns and villages are under the urban influence and there are many commuting activities between the cities and the towns and villages and within the towns and villages themselves, the occupational structure of the places may not necessarily reflect the local economic strength or weakness. Furthermore, the dispersal of population and industry from cities may ignore the local occupational structure in the towns and villages. However, local occupational structure is not totally meaningless in

the study of the population changes in the towns and villages, because most of the people living in the Canadian towns and villages were employed locally, although this situation varies from place to place. Hodge and Qadeer (1983) showed that in the towns and villages through Canada in 1971, only 28.9 percent of the resident labour force were out-commuters. The small villages (size less than 500) had the lowest percentage of the out-commuters (25.7 percent), and the small towns (size from 1,001 - 2,500) had the highest percentage of the out-commuters (32.9 percent).

Studies examining the influence of occupational structure on the population change in towns and villages are few. However, there are quite a few studies about the retail services of towns and villages based on the central place theory, some of which relate the retail services with the population change of the places (such as Hodge, 1965; and Stabler, 1987). This thesis does not include retail service of the towns and villages as the influencing factor because (1) all the study towns and villages are under urban influence, with many past local retail services having been taken over by the urban centers, and the local retail services may no longer completely reflect the needs of the local people; (2) the data about retail services in the towns and villages are not adequate for the purpose of this study. Thus, the studies on the retail services influencing the population change in towns and villages are not reviewed



in this thesis.

Income and unemployment rate are two important indicators of a place's economic situation, and may also be of importance in the place's population change if the economic reasons were still the main grounds for people's migration. Therefore, these two economic factors are included in this thesis to study their relation with the population change of the Ontario towns and villages. While the past studies about the unemployment rate and the income factors were mainly concerned about migration in interregional or intermetropolitan level, this thesis uses the two factors to test if they are also important in the study of the towns and villages level.

Cordey-Hayes (1975) summarized the traditional economic approach to migration and held that the traditional economic approach was essentially based on a "push-pull" phenomenon, migration was motivated by poor employment conditions (low income, high unemployment) and migrants were attracted to areas with high income and low unemployment, since out-migration reduced the labour surplus and in-migration reduced the labour shortage.

Roger (1967) used regression analysis to study interregional migration in California during the 1955-1960 period. In his model, income was an important factor. The migration was directly related to high wages at the destination place and inversely related to high wages in the

original place. Distance was also found to be a significant factor influencing the migration. However, unemployment rate was found insignificant to the migration. Courchene (1970s) studied the relationship between Canadian interprovincial migration and some factors such as income, unemployment rate, distance, age, and education by using 1961 census data. This study confirmed that migration was positively related to income differences and negatively related to distance. Besides, high unemployment rate in the original place was found to be increasing the out-migration, and education was found to be positively related to both in- and out-migration.

Sommers (1973) took net interstate migration as a dependent variable and income and unemployment rate as independent variables to run regression analysis in the USA during the two decades of 1950-60 and 1960-70. The results showed that the income factor was highly significant in both of the two decades, indicating people moved from lower income area to higher income area. The unemployment rate factor was highly significant in the 1960-70 decade, but nonsignificant in the 1950-60 decade. Sommers suggested that two factors might weaken the effect of unemployment on the migration: (1) unemployment rate was correlated with income to some extent, so it lost some of its statistical power to income; (2) unemployment compensation benefits might inhibit the out-migration.

DaVanzo (1978) investigated 1,605 households living in the USA based on a nationwide data survey and discovered that the families whose heads were unemployed or were dissatisfied with their jobs were more likely to move than other families. He found that local economic conditions did affect out-migration, but only among those people who were unemployed.

Williams (1981) examined the economic cause of migration in the nonmetropolitan areas of Midwest in the USA during two decades of 1950s and 1960s and concluded that no evidence was found of declining importance of traditional employment-related factors as determinants of migration. He mentioned that quantitative macromodels of migration usually employed an indicator such as unemployment rate in order to measure the availability of jobs. It was suggested that the greater the unemployment level, the greater would be the level of out-migration and the less would be the level of in-migration. There was considerable evidence supporting this in aggregative studies such as Blanco, 1963; 1964; Rabianski, 1971; Cebula and Vedder, 1973; and Sommers and Suits, 1973. In Williams' study, unemployment was found to tend to decrease in-migration in both decades but does not contribute to out-migration. Income was found to perform a positive influence on the rate of employment growth which affected the migration during the two decades.

### (3) Size of Towns and Villages

Size of a place has generally been found to be positively related to its population growth in many studies. The reason appears to be that a large size place has wider variety of service activities and greater job opportunity than a small size place, so the large place looks more attractive than the small place. However, some studies in recent years have shown the evidence that some small size places may also have higher population growth rates than the large size places (see Johansen and Fuguitt, 1984). This phenomenon coincides with the trend towards counter-urbanization in recent years. This implies that if the size factor used to be positively related to the population growth, this relationship is weaker, if not reversed, in recent years.

Ratcliffe (1942) in a study of population change in villages (size less than 2,500) in the USA, divided these villages into three size groups and found that during the five decades of 1890-1940 the smaller size villages generally lost greater percentage of their population than the larger size places. Brunner (1951,1952) reached a similar conclusion for villages in the USA during the 1940-50 period. He found that the villages of 1,000-2,500 size group increased in population, while the villages of 250-1,000 size group showed wider divergences and regional differences, and hamlets (size less than 250) lost

population. Fuguitt and Dealey (1966) studied the population change in small towns in Wisconsin during the decade of 1950-60 and found that the large size villages were more likely to grow compared with the small size villages.

Tarver and Beale (1968) used multiple regression analysis to explain the 1950-60 population change of nonmetropolitan towns and cities in the South of USA with four selected variables: size of place, regional location, county seat status, and distance to the nearest metropolitan centre. The size factor turned out to be the most important variable to explain the population change. This factor was positively related to population change of the places during the 1950-60. Johnston (1969) studied population change in Australian small towns (population size from 1,000 to 5,000) during 1961-66, his finding was that the smaller size places had larger population declines.

Fuguitt and Zuiches (1975) in a nationwide survey in the USA found that people tended to live in a smaller place but close to the city. Hodge and Qadeer (1983) showed in Canadian towns and villages from 1971-76 that usually the places with a population of less than 500 were losing population, while the places with more than 500 population were gaining population, and the larger the size, the larger was the percentage gain. Johansen and Fuguitt (1984) divided American villages (with population size less than

1,000) into four size groups and showed that in the USA during the 1950-70 the larger size villages usually had larger population growth rates than smaller places, but during the 1970-80 the places with sizes less than 250 had higher growth rates than larger places. When they used multiple regression analysis they discovered that the size of place had a significant and positive relationship with the population change during the 1950s, while it was not significant during the 1960s, and it again became significant during the 1970s with a negative relationship with the population change. Ballard and Fuguitt (1985) observed that during the population concentration periods of 1900-30 and 1940-60 the population growth in the USA was positively associated with the initial size of the places, while in the village revival periods of 1930-40 and 1960-80 the population growth of large places slowed down and the smaller places grew faster.

#### (4) Regional Location

Regional location of towns and villages is supposed to have influence on the population change of these towns and villages, because the economic situation in different areas is not the same. The studies about the influence of regional location on the population change of towns and villages might be classified into two categories: (1) most of the studies utilize tables or maps to show that different

regions have different population growth rates such as Northam (1963) and Hodge and Qadeer's (1983) study about population growth in the towns and villages in different Canadian provinces; some studies show that there exists difference of population changes in towns and villages located in metropolitan areas and in nonmetropolitan areas such as Robinson's (1965) study in the USA. (2) Some studies used multiple regression to find the importance of the regional location to explain the population changes in towns and villages such as Brozowski's (1971) study about population change in Ontario towns and villages.

Robinson (1965) found that during the 1900-1960 period in the USA rural population growth rates within the metropolitan areas were higher than the national average, while in nonmetropolitan areas rural population had almost no growth. He also discovered that the regional differences in population growth rates were diminishing during the 1900-1960 period. In Tarver and Beale's (1968) study, among the four influencing factors, size of towns and villages, regional location, county seat status, and distance to the nearest city, regional location of the towns and villages was found to be the second important influencing factor in their population changes. They classified southern United States into nine economic regions and showed different regions had markedly different population growth rates.

Johnston (1969) studied population change in Australian

small towns during the period of 1961-66, and discovered that in Australia the small towns within the zones of a metropolitan area had smaller decline than those within the zones of non-metropolitan area. Brozowski (1971) examined regional location as a factor which influenced the population change in the Ontario towns and villages and found it to be the third most important factor to explain the population change. Among his five influencing factors, only size of the nearest city and distance to the nearest city were more important than the regional factor. In his study Ontario was divided into nine economic regions, and each region was used as one independent variable in the multiple regression analysis. According to Brozowski, some regions such as Lake St. Clair Region and Northern Ontario Region had strong positive regional influence on the population growth of the towns and villages located within them, while some other regions such as Lake Ontario Region and Eastern Ontario Region had less influence on the population growth of their towns and villages. The reason was that the former had experienced considerable economic growth, particularly in manufacturing, while the latter had a retarded economic development in manufacturing during that period.

Morrill (1980) classified the USA into core regions (urbanized regions) and peripheral regions. In core regions the smaller places and the places farther away from the



cities tended to grow faster while in peripheral regions the situation was reversed. Johansen and Fuguitt (1984) divided the USA into four regions: North, Plains, South, and West, and compared the population changes in the villages in each region through every decade from 1950 to 1980. They showed that the four regions had different population growth patterns. The villages in the North Region had the fastest population growth during the 1950-60 decade, but the growth rate declined in the latter two decades. Those villages located in Plain Region always had the slowest population growth during the three decades, while villages in South Region and in West Region had greatly increased their population growth rate during the three decades. Barnard and Krautmann (1988) used the four U.S. regions as dummy variables to test whether there existed difference in the population growth rates among the regions. They found that the population rates differed significantly at the regional level, which indicated that the regional factor was an important one to influence the population changes.

The above literature review shows that population changes have been influenced by some factors. The urban shadow, economic, regional, and size factor have been identified as important factors to the population changes in the towns and villages. This thesis tries to find out if there is any change of the role of these influencing factors in the more recent time period. The methodology of the

thesis is mainly adopted from Brozowski's (1971) study in order to update his work.

### III. Methodology

This thesis examines population changes in the Ontario towns and villages during the two decades of 1961-1971 and 1971-1981. The towns and villages are defined as the incorporated places with population sizes less than 10,000; while the cities are defined as the settlements with population sizes larger than 10,000. The study includes all the Ontario towns and villages located within 30 miles (50 km) of cities as was done by Brozowski. Five influencing factors are included in the thesis for examining their relationships with the population growth rates of the towns and villages, namely: (1) sizes of the towns and villages, (2) sizes of the nearest cities, (3) distances of the towns and villages to their nearest cities, (4) location within Ontario's economic regions, and (5) occupational structure of the towns and villages.

The number of towns and villages in this thesis is 166 in the period of 1961-71 and 163 in the period of 1971-81. All the data about the population size of the towns, villages, and cities were obtained from Census Canada. The population growth rates of the towns and villages were computed based on the size of these places in the census of

1961, 1971, and 1981 respectively. When a place changed its boundary during the study period, its population was adjusted accordingly so that the data of the place were comparable through time. In the period of 1961-71, there were about 30 towns and villages that changed their boundaries. The information of the boundary change was available in the census data, and the population sizes of all these places in 1971 were changed to fit the 1961 boundaries. In the period of 1971-81, the places which changed their boundaries were adjusted according to the boundary change in the census data itself.

The distances between the towns and villages and their nearest cities were limited within 50 km (30 miles) in this study as this distance was considered as the most common commuting distance. According to Hodge and Qadeer (1983), Canada's average commuting distance in 1970s was about 22 miles, so 50 km (30 miles) would cover most of the commuting activities. The data for the distances was derived from the official Ontario Department of Highways Map. If a place was located at a similar distance from two cities, it would be relegated to the larger city. However, few such cases were encountered.

The regional location data were based on the Regional Development Branch of the Treasury Department's economic regional divisions of Ontario, which were also used by Brozowski in his study. There were nine economic regions in

the study. Since Ontario had a great internal regional economic diversity, it was necessary to divide Ontario into different regions to examine and compare the population changes in each region. The occupational data of all the study towns and villages relates to the initial years of the two study decades, and were drawn from 1961 and 1971 census. The occupational data were divided into three categories as Brozowski did, namely: percent of employment in the primary sector, percent of employment in the blue collar sector, and percent of employment in the service sector.

Correlation and stepwise regression analyses were used in Brozowski's study. This thesis runs the same analyses in order to compare with Brozowski's study. The analyses took population growth rates of the towns and villages during the two decades of 1961-71 and 1971-81 as the dependent variables and the five influencing factors mentioned earlier as the independent variables. Among the five influencing factors, regional factor included nine economic regions, each region was an independent dummy variable, which entered into the correlation and regression analyses. The occupational factor consisted of three independent variables: primary, blue collar, and services. The results of the analyses,  $r$  values and  $RSQ$  values, were compared with the results of the previous two decades derived by Brozowski.

Brozowski studied residuals after running the stepwise regression analyses. The residuals in his study were those towns and villages whose population growth rates were either higher than +0.75 standard deviation or lower than -0.75 standard deviation of the regression models. This thesis did not study the residuals because residual study needed a detailed investigation of the each residual place in order to obtain a meaningful result. Such an investigation would take much time and space. Although Brozowski studied the residual places in his thesis, his explanations were not adequate and did not reveal any new influencing factors to improve the explanation of the population changes in the towns and villages. Thus, it may be better to leave the residual places to another more comprehensive study, perhaps another thesis, so that the real causes of the growth or decline in these residual places can be revealed and analyzed. Besides, residual study was not comparable over time, so there was no need to study the residual places for the purpose of comparison.

This thesis uses the simple tabulation method to further reveal the relationship between the population changes in the towns and villages and the five influencing factors. The influencing factors were grouped and the population growth rates of the towns and villages in these groups were compared with each other. The nearest city size factor was divided into three groups: 10,000 - 100,000,

100,000 - 1,000,000, and larger than 1,000,000, so that the effects of the different city sizes on the population growth in the towns and villages could be examined. The distance factor was divided at a 10 km interval so that we could examine how the population growth rate of the towns and villages changed along the distance. The size factor was divided into three groups: large size places (2,500-10,000), medium size places (1,000 - 2,500), and small size places (less than 1,000). The population growth rates of the different size groups were compared. The regional factor was divided according to the nine economic regions and the regional growth of the towns and villages was discussed. The occupational factor was divided according to the occupational specialization of the towns and villages. The towns and villages were classified into seven specialized types and one diversified type, and the growth rates of the occupational types were compared and discussed. The method of the classification of the occupational types was based on Tarver's (1972) method, more detail about this would be presented in the following chapter. To assist the above tabulation study, two special groups of towns and villages were created: one was "declining places", another was "high growth places". The declining places were defined as those towns and villages whose population growth rates were negative during the study period. The high growth places were defined as those towns and villages whose

population growth rates ranked in the upper quartile of all the non-declining towns and villages. The lines drawn to distinguish the declining places and the high growth places from the "normal growth places" were arbitrary. It is impossible to draw "objective" lines because the distribution of the population growth rates in the towns and villages was continuous. The distributions of the declining places and the high growth places in relation to the above noted influencing factors were discussed and compared in order to further highlight the possible role of these factors in the population changes in the towns and villages.

The study of the population change in the towns and villages during the 1961-71 period and the 1971-81 period was done in Chapter II and Chapter III. In a latter chapter, this thesis modified the above-mentioned influencing factors. The purpose was to see if these new factors could explain the population change more effectively.

In the earlier chapters, the two factors, namely, size of the nearest city and distance to the nearest city, were used singly to measure the influence of the nearest city on population change in the towns and villages. However, it may be more reasonable for us to assume that not only the nearest city but also other nearby cities would have an influence on the population change if these nearby cities were located within commuting distances of 30 miles (50 km).

All the nearby cities located within 50 km of the towns and villages were taken and the sizes of these cities and the distances from these cities to the towns and villages were combined together to form a composite measure of the "urban shadow" factor, based on the formula:  $U = (P_i/D_i)$ . Here,  $U$  stands for the value of urban shadow,  $P_i$  is the population size of the  $i$ th city; and  $D_i$  is the distance from the examined town or village to the  $i$ th city. The value of  $P_i/D_i$  is based on the fact that the influence of the large city is stronger on its surrounding area than that of the small city, and the place near the city is more strongly influenced by the city than the place far away from the city. While the  $P_i/D_i$  considers only one city, the  $(\sum P_i/D_i)$  takes into account all the nearby cities. To determine the effects of the distance in the urban shadow factor on the population growth rate, the formulas  $U_1 = (P_i/D_i)$ ,  $U_2 = (P_i/D_i^{0.5})$ , and  $U_3 = (P_i/D_i^2)$  were used. The three regression analyses were run with the population growth rates of the towns and villages during the 1971-81 as the dependent variable and the values of  $U_1$ ,  $U_2$ , and  $U_3$  as the independent variables respectively. The results of the regression analyses were compared with each other in order to select the best urban shadow value.

This thesis also attempts to modify the occupational structure factor. Brozowski divided the occupations of the towns and villages into three groups and the occupational



factor was shown to have little influence during the study periods of Brozowski's thesis. He suggested that dividing occupations into more groups might lead to better results. In order to improve the occupational factor in explaining the population change in the towns and villages, this part of the thesis divided the occupations into seven groups instead of three, namely: manufacturing; farmers; miners & other primary; transportation; service; sales; and 'other occupations'. These groups of occupations are based on the occupational divisions of the 1971 census data.

Two new economic factors, unemployment rate of the towns and villages and average income of the towns and villages, were taken as two independent variables to study the population change in the towns and villages during the period of 1971-81. People in a place with a higher unemployment rate were more likely to move out to find jobs; in the same way, a place with a lower unemployment rate perhaps was more attractive than a place with a high unemployment rate. Because people were not only working in their own place, they were also looking for jobs and work in the nearby cities and towns and villages, so the unemployment rate of a place not only reflected the local economic condition, it was also related to the economic conditions of the nearby places. Thus, unemployment rate factor could be viewed to some extent as an economic indicator of an area, not only of a place. Since

unemployment rate is a relatively unstable factor over time, the data from 1971, 1976, and 1981 census were used to measure the average unemployment rate for the decade of 1971-81. The unemployment rates of the towns and villages in the three census data were averaged to form the unemployment rate factor for the whole decade. Income was considered as another important economic factor, as people were assumed to prefer to go to a high income area rather than to a low income area so that they could improve their economic condition. Not all the high income places are necessarily the high wage places, some high income places may be due to concentration of high income people who earn their income in some other places. These kinds of places are usually environmentally attractive places, because higher income people could better afford to move there. Thus, the income factor could indirectly measure the amenities of the places to some extent. The data of income used in this study was drawn from 1971 census.

With the above influencing factors as the independent variables and the population growth rates in the towns and villages in the 1971-81 as the dependent variable, the correlation and stepwise regression analyses were run. The results of the analyses were compared with those of the same time period done in the previous chapter in order to see how much the modified and changed factors could improve the explanation of the population change in the towns and

villages.

The last chapter summarized the results in the previous chapters, brought out the conclusions, and made some suggestions for further research.

## Chapter II

### Population Change in Ontario Towns and Villages, 1961-1971

Population growth in Ontario slowed down during the decade of 1961-1971 as compared with the previous decade from 35.6 percent to 23.5 percent. This was mainly due to a decline in the natural population increase rate in the country and the province. The average rate of natural increase in Ontario for the three years of 1951, 1956 and 1961 was 16.8 percent, while the average for the three years of 1961, 1966 and 1971 was 12.6 percent. The number of immigrants to Ontario during the 1960s was also less than that during the 1950s: 761,800 compared with 817,300. The information about the internal migration during the 1950s is not available, but there were more in-migrants to Ontario than out-migrants during the 1960s, with the former 1,032,400 and the latter 806,300. (Ontario Statistics, 1984).

The decrease in population growth rate reflected social and demographic changes in the country, since there was no major economic decline to coincide with the decrease in population growth rates. On the contrary, Canada's economy

continuously prospered and expanded during the 1960s. The expansion of manufacturing and service industries in Ontario during the 1960s far exceeded that during the previous decade. For example, the total employment in Ontario manufacturing industries increased by 7.5 percent during 1951-59, while from 1961 to 1969 it increased by 38.9 percent (Ontario Statistics, 1975). Durable goods industries expanded especially fast, and the Canada-U.S. Automotive Agreement in 1965 was a particular stimulant to Ontario's economic growth (Sitwell and Serfried, 1984).

The population growth rate in Ontario towns and villages during the 1960s was 15.8 percent (Hodge and Qadeer, 1983), which was much lower than the average growth rate of 23.9 percent for Ontario's total population. Since most of the people lived in either cities or towns and villages, the low percentage of the population growth in the towns and villages indicates that the population concentration in cities was still strong during that period. Meanwhile, population decentralization was also going on, the spreading out of population and industries from cities increased the population growth of the towns and villages near the cities. As Hodge and Qadeer (1983) showed, the towns and villages located within 30 miles of the metropolitan cities had higher population growth rates than the average growth rate of all Ontario towns and villages.

## Correlation and Stepwise Regression Analyses

Following the methodology adopted by Brozowski (1971), in this study the population change of the towns and villages located within 30 miles of the cities was examined in relation to the five likely influencing factors, which were broken down to 15 variables, by running the correlation analysis and stepwise regression analysis. The relationship between the population growth rate of these towns and villages and the 15 independent variables was revealed in the Table 2.1.

That table shows that the variables of city size<sup>3</sup>, service and blue collar had positive relationships with the rate of population growth in the towns and villages. The variables of primary employment, size and distance had negative relationships with the rate of the population growth. Among the 15 variables, only the city size variable, Northern Ontario Region variable, and Central Ontario Region variable were significant at the 0.05 level. Besides, the distance variable was significant at the 0.15 level, while all the other variables were insignificant.

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3. city size is the short name for the size of the nearest city, so are the other terms: service is the percent employment in service sector, blue collar is the percent employment in blue collar sector, primary is the percent employment in primary sector, size is the size of the towns and villages, and distance is the distance of the towns and villages to their nearest city. These short terms are used in this thesis for convenience.

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Table 2.1 Correlation between the Population Change and  
the Influencing Factors, 1961-1971

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Variable	r
1 size of the nearest city	0.26426 *
2 percent employed in service sector	0.05523
3 percent employed in blue collar sector	0.04855
4 percent employed in primary sector	-0.07667
5 size of towns and villages	-0.02624
6 distance to nearest city	-0.12193
7 Northern Ontario Region	-0.18518 *
8 Eastern Ontario Region	-0.09161
9 Lake Ontario Region	-0.07226
10 Georgian Bay Region	0.13843
11 Central Ontario Region	0.16273 *
12 Midwestern Ontario Region	0.03934
13 Niagara Region	0.10001
14 Lake Erie Region	-0.12043
15 Lake St. Clair Region	0.01917

---

\* significant at 0.05 level

Table 2.2 shows the comparison over the three decades of 1941-1971. The r values of the variables in the 1941-51 and the 1951-61 were derived from Brozowski's study, while

those in the 1961-71 were done in this thesis.

Table 2.2 Comparison of the Correlation Analyses,  
1940s, 1950s, and 1960s

variable	r		
	1941-1951	1951-1961	1961-1971
city size	0.411 *	0.144	0.264 *
service	-0.040	-0.026	0.055
blue collar	0.035	0.062	0.048
primary	-0.096	-0.024	-0.076
size	0.128	0.118	-0.026
distance	-0.349 *	-0.318	-0.122
Northern Ontario	-0.090	0.200 *	-0.185 *
Eastern Ontario	-0.171	0.003	-0.092
Lake Ontario	-0.181	-0.024	-0.072
Georgian Bay	-0.207	-0.071	0.138
Central Ontario	0.319 *	0.240 *	0.163 *
Midwestern	-0.008	-0.034	0.039
Niagara	0.154	0.204 *	0.100
Lake Erie	0.011	-0.027	-0.120
Lake St. Clair	0.202	0.120	0.019

\* significant at 0.05 level



From the Table 2.2 we can find that the city size variable maintained strong positive  $r$  values during the three decades, which indicates that the towns and villages in the vicinity of a larger city had a faster growth than those near a smaller city during the three decades. None of the three occupational variables had large  $r$  values, which means that the relationship between the occupations and the population growth rate were always weak during the three decades. The positive  $r$  value of blue collar indicates that a place with a larger portion of blue collar workers tended to grow at a faster rate. At the same time, the negative  $r$  value of the primary variable indicated that a place with a larger portion of primary workers tended to grow at a slower rate. This was the case for all the three decades.

The relationship of population growth with the size variable was stronger than with the occupational variables during the 1940s and the 1950s, and the positive sign indicates that the larger place generally had higher population growth. However, the decline of  $r$  values in 1950s and the change of correlation direction in 1960s means the relationship between the size variable and population growth was becoming less clear through time. The Distance variable had a relatively strong negative relationship with population growth during all the three decades. A place closer to a city always had a better chance of growing faster. A decrease of absolute  $r$  values in the three

decades implies the decline of importance of the distance over time. This may be explained by the improvements in transportation and commuting during this period.

Ontario was divided into nine economic regions (figure 2.1) and the nine regions formed nine regional variables. Among the nine regional variables, Central Ontario Region was the most important one in explaining the population changes during the 1941-51 and 1951-61 periods, but it dropped to the second important position during the 1961-71 period. Northern Ontario Region was important during the 1951-61 and 1961-71 periods and it was the most important variable during the 1961-71 period. An unusual feature of this variable was that its  $r$  value changed from strong positive to strong negative during the two decades of 1951-61 and 1961-71. The Georgian Bay Region was relatively important during the 1941-51 and 1961-71 periods but was not important during the 1951-61 period. The  $r$  value of this variable changed from negative during the 1941-51 and 1951-61 periods to positive during the 1961-71 period, indicating that the towns and villages in this region grew faster through time during the three decades.

Using stepwise regression analysis to remove possible inter-correlations between the independent variables, it is evident that the city size variable was the most important factor in explaining the change in population growth in the towns and villages during the 1960s (Table 2.3). Distance

# ONTARIO ECONOMIC REGIONS

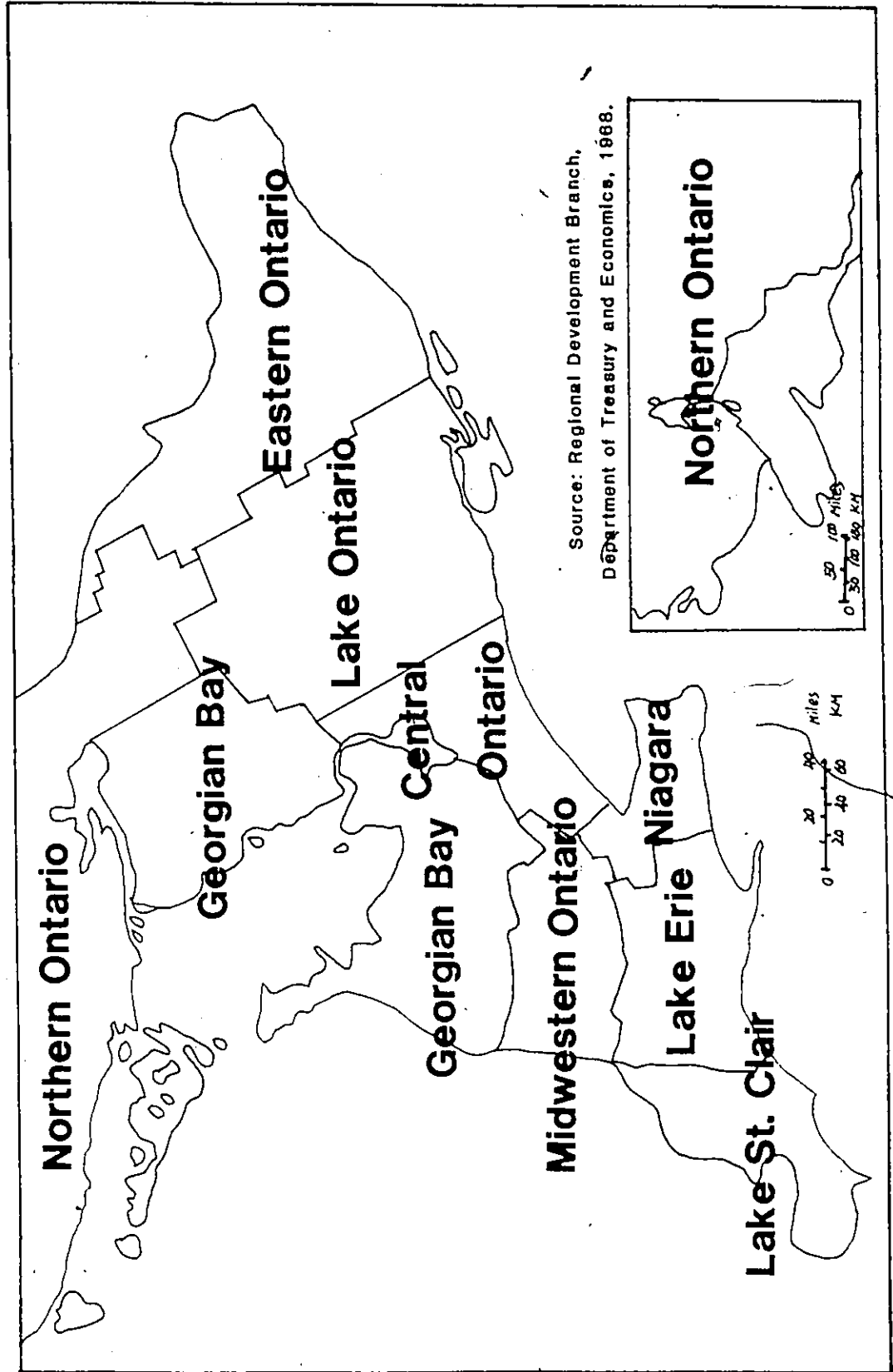


Figure 2.1

was also a relatively important variable. Two regional variables were also important. These four important variables highlight the importance of the urban shadow factor and the regional factor to the population change in the nearby towns and villages, although these four variables themselves had only small RSQ values.

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Table 2.3 Stepwise Summary Table 1961-1971

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Variable entered	partial RSQ	model RSQ
city size	0.0698	0.0698
Northern Ontario Region	0.0312	0.1010
distance	0.0174	0.1184
Georgian Bay Region	0.0204	0.1388

---

The above four variables were the only ones among the 15 independent variables which met the 0.15 significant default level set in the computer and entered into the stepwise regression model. The four variables totally explained 13.88 percent of the dependent variable -- population growth rate. After changing the significant level from 0.15 to 1.00, the rest of the eleven independent variables were able to enter the regression model, the total explanation of the 15 independent variables went up to 17.26 percent of the dependent variable. Comparing these results

Table 2.4 Comparison of the Stepwise Analyses

1940s, 1950s, and 1960s 4

1941-51		1951-1961		1961-1971	
variable	RSQ	variable	RSQ	variable	RSQ
1 city size	0.168	2	0.101	1	0.070
2 distance	0.285	7	0.193	13	0.101
3 Lake St. Clair	0.337	1	0.232	2	0.118
4 Niagara	0.352	12	0.250	12	0.138
5 Lake Erie	0.365	4	0.261	5	0.148
6 Midwestern	0.374	3	0.266	14	0.158
7 Central Ontario	0.384	14	0.271	15	0.166
8 size	0.392	15	0.276	7	0.168
9 primary	0.393	6	0.280	8	0.169
10 blue collar	0.396	13	0.285	11	0.171
11 service	0.401	9	0.289	4	0.172
12 Georgian Bay	0.402	8	0.292	10	0.172
13 Northern Ontario	0.402	5	0.292	9	0.172
14 Eastern Ontario	0.402	10	0.292	5	0.173
15 Lake Ontario	0.402	11	0.292	3	0.173

4. the number in the column of "variable" stands for the name of the variable, for example, Number 1 stands for city size, Number 2 stands for distance, and Number 7 stands for Central Ontario Region.

with Brozowski's study of the two decades of 1941-51 and 1951-61, we get the above table (Table 2.4).

From the Table 2.4, we can observe: first, the total RSQ values were not very large for all the three decades, thus indicating that the chosen independent variables are not very effective to explain the dependent variable. Second, the total RSQ values decreased through the three decades, which may imply that the influencing factors in population growth in towns and villages were becoming more diversified through time. Third, city and distance variables show to be the most important factors in explaining the population growth and their relative importance was maintained throughout the three decades, even though the RSQ values of both variables were decreasing. Fourth, size and occupational variables hardly explained the dependent variable in any one of the three decades, and the size variable was only a little better than occupational variables. Fifth, regional variables display a great variation for their importance in explaining the population changes. A few regions had relatively large RSQ values such as Lake St. Clair Region and Niagara Region during the 1941-51 period, Central Ontario Region and Georgian Bay Region during the 1951-61 period, and Northern Ontario Region and Georgian Bay Region during the 1961-71 period, but the RSQ values in some other regions were equal to zero.

### High Population Growth Places and Declining Places

To further reveal the relationship between the population changes in the towns and villages and the influencing factors, a more detailed discussion of the influencing factors is needed. Two special place groups, the "declining places" and the "high growth places" were determined to assist this discussion. In the period of 1961-71, there were 166 towns and villages in the study area, with an average population growth rate of 15.7 percent. The growth rates in most of the places (77 percent) fell into  $\pm$  one standard deviation (varying from -2.6 percent to 34.0 percent). The minimum value of the growth rates in the towns and villages was -10.2 percent, while only a few places (five) had relatively extremely high growth rates (higher than 50 percent). There were no apparent breaks in the distribution of the population growth rates to distinguish the "high" or "low" growth places from the "normal" growth places, so it was necessary to draw the lines arbitrarily. There were 23 places declining during the period of 1961-71, and these places were grouped as "declining places". The "high growth places" were taken from the upper quartile of the whole group of non-declining places. The number of those places was 37 with the lowest growth rate at 22.0 percent. Together, these two groups had 60 towns and villages, accounting for 37 percent of all the

places. The geographical distribution of the declining places and the high growth places is shown in Figure 2.2. From the map we can see that there were almost no declining places but many high growth places in the area of Toronto-Hamilton-Niagara Region (Golden Horseshoe), while the declining places were distributed more widely.

### Influencing factors

#### (1) City Size

Among the influencing factors, city size explained best the population growth in the towns and villages. Table 2.5 shows the average growth rates of all the towns and villages in the study and their relationship with the nearest city ranked by size.

The table indicates that the places located around larger size cities had greater average growth rates. For the places with the city size of 10,000-100,000, the average growth rate was 12.0 percent. All the 23 declining places fell into this city size group, which accounted for 18.3 percent of all the 126 places in this group. The number of the high growth places in this city size group was less than that of the declining places. For the places with the city size of 100,000-1,000,000, the average growth was 20.2 percent, and there were no declining places but 10 high growth places, forming 32.3 percent of all the 31 places in



# DISTRIBUTION OF THE HIGH GROWTH PLACES AND THE DECLINING PLACES

(1961 - 1971)

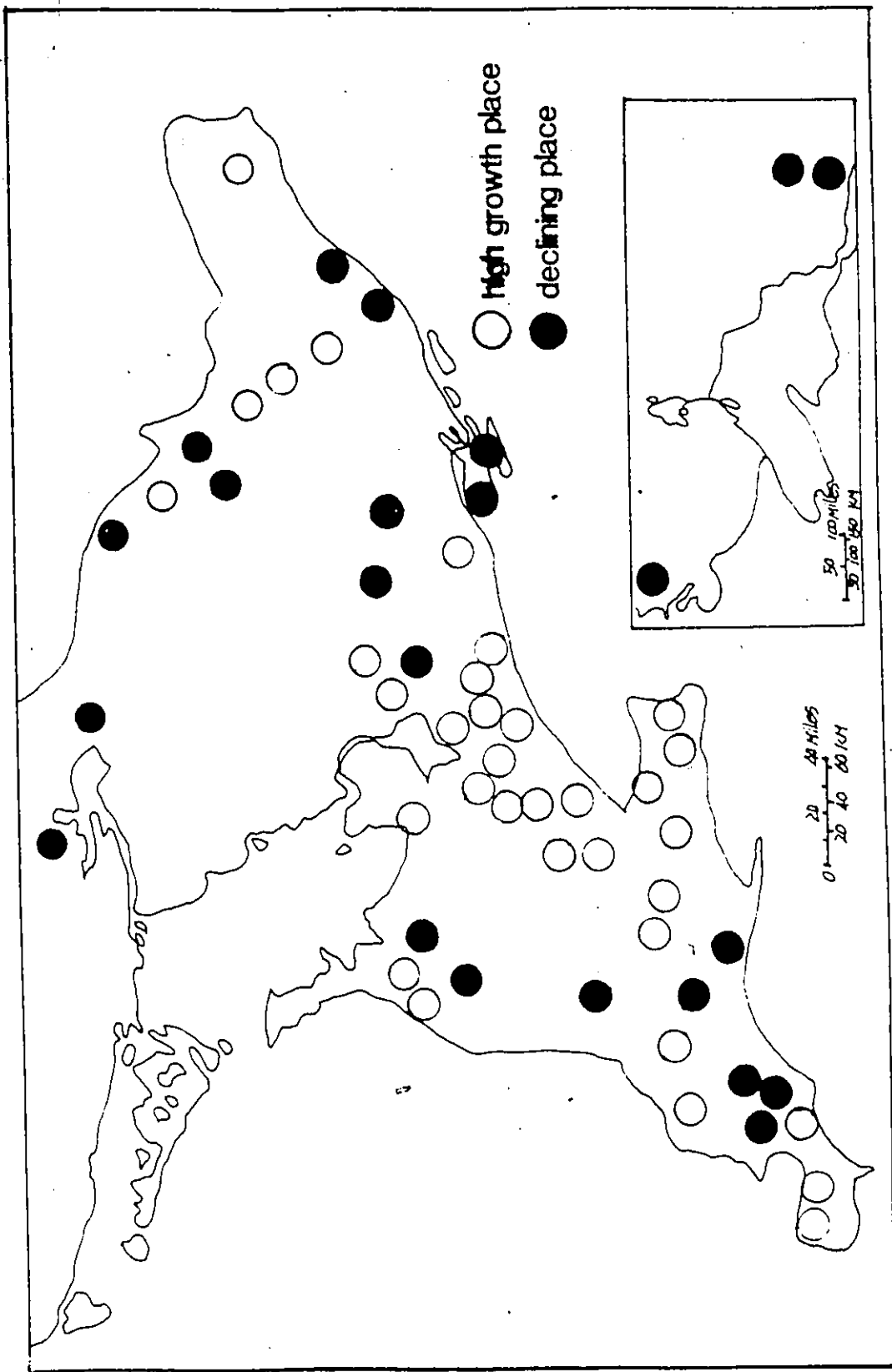


Figure 2.2

Table 2.5 City Size and Growth Rate, 1961-1971

city size	10,000-100,000	100,000-1,000,000	>1,000,000
growth rate (%)	12.0	20.2	47.5
No. of all Places	5126	31	9
No. of D places	23	0	0
(% of all places)	18.3	0.0	0.0
No. of H places	19	10	8
(% of all places)	15.1	32.3	88.9

this group. For the places with the city size larger than 1,000,000, the average growth rate was 47.5 percent. Among the 9 places in this group, 8 places were the high growth places. The proportion of the high growth places shows a fast increase with the increase of the city size in the three city size groups. This pattern indicates that the places close to large nearest cities were more likely to become high growth places than those close to smaller nearest cities.

None of the declining places were located near large cities, the largest nearest city for the declining places was Sudbury (population 82,120 in 1961). This indicates

5. In this table the D places mean declining places, and the H places mean high growth places. These shorten terms were created because of the limited space in the table. These terms were also used in the following tables.

that the declining places were mainly concentrated around the small cities. When the nearest city size in the first group (10,000 - 100,000) was further divided into three size groups with all the groups including about the same number of places, the smaller city size group had more declining places than the larger city size groups (see table 2.6).

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Table 2.6 City size and Declining Places, 1961-71

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city size	10,000-20,000	20,000-40,000	40,000-100,000
No. of all places	48	40	38
No. of D places	11	7	5
(% of all places)	22.9	17.5	13.2

---

There were 48 towns and villages whose nearest city size was ranked between 10,000-20,000. Among the 48 places 11 of them were the declining places, accounting for 22.9 percent of the 48 places. From the change of the percentage of the declining places in the three city size groups, we can see that the population decline was more likely to occur in the places closing to the smaller cities.

## (2) Size of the Towns and Villages

The very small RSQ value of the size variable in the regression indicated the lack of a strong relationship

between the size variable and the population growth rate. Table 2.7 shows the relationship between the size and the population growth rates of the towns and villages.

-----  
Table 2.7 Size of the Places and Growth Rates, 1961-1971  
.....

size of the places	<1,000	1,000-2,500	2,500-10,000
average growth rates (%)	14.2	18.0	13.2
No. of all places	43	70	53
No. of D places	9	10	4
(% of all places)	20.9	14.3	7.5
No. of H places	7	22	8
(% of all places)	16.3	31.4	15.1

-----

The table shows that the places in the medium size group had the largest average growth rate, while the places in the large size group had the smallest average growth rate. In the small size group the 9 declining places formed 20.9 percent of the total 43 places in this size group. In the medium size group the percentage of the declining places was 14.3, and in the large size group this percentage decreased further to 7.5. This change of the percentage indicates that the smaller places were more likely to decline than the larger places. However, the large size places did not have the tendency of growing faster than the small size places. The table shows that most of the high

growth places were in the medium size group. The 22 high growth places in this group accounted for 31.4 percent of all the 70 places in the size group. The proportion of the high growth places in both small size group and large size group was much smaller than that in the medium size group. Besides, the large size group had the smallest percentage of the high growth places among the three size groups. The pattern indicates that the size of the place was not an important factor in its population growth. A large size place usually had a better economic base than a small size place, which might enable the large size place to resist decline better than the small size place. But the large size places in the table did not show advantage to grow faster than the small size places. For the growth of the towns and villages, some other factors such as the distance of the place to the nearby cities, the sizes of the nearby cities, and the establishment of the industries in the place might be much more important than the size of the place.

### (3) Distance to the nearest city

Table 2.8 shows the relationship between the distance and the population growth rates in the towns and villages.

The table indicates that the towns and villages located within 10 km of the nearest city had an average population growth rate of 22.7 percent, while the places located beyond 10 km had the average population growth rates between 14 and

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 Table 2.8 Distance and Population Growth Rate, 1961-71  
 .....

distance (km)	<10	10-20	20-30	30-40	>40
growth rate (%)	22.7	14.7	14.5	14.2	15.7

-----

16 percent. This indicates that the places located very close to the nearest city had some advantage to grow as compared with other places located farther away from the nearest city. The average growth rates of the places beyond 10 km were close to each other, indicating that the variation in distance did not exert any marked influence on the growth of these places.

Table 2.9 shows the distribution of the declining places and the high growth places along the distance to the nearest city.

This table brings out the fact that among the 14 towns and villages located within 10 km of the nearest city, only 1 place was declining place while 6 were high growth places. The proportion of the high growth places in this distance group was quite high, which indicates that the towns and villages within 10 km of the nearest city were much more likely to grow fast rather than to decline. The percentage of declining places in all the places located within 10 km of the nearest city was small, but the percentages of the declining places in other distance groups

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Table 2.9 Distribution of High Growth Places and Declining  
Place in Distance Groups, 1961-1971

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distance (km)	<10	10-20	20-30	30-40	>40
No. of all places	14	35	40	48	29
No. of D places	1	5	6	7	4
(% of all places)	7.1	14.3	15.0	14.6	13.8
No. of H places	6	8	10	9	4
(% of all places)	42.9	22.9	25.0	18.6	13.8

-----

were nearly the same. Meanwhile, the percentage of the high growth places in all the distance groups was generally decreasing as the distance increased. From the table, it seems that the distance effect was very significant for those towns and villages located within 10 km of their nearest city. Beyond the 10 km, the distance effect on the towns and villages, especially on the declining places, was weak.

#### (4) Regions

The divisions of the Ontario economic regions have been shown in the Figure 2.1. Since Brozowski did not study regional population growth, there were no data to compare the period of 1961-71 with the two previous decades. The average population growth rates of all places in the nine

economic regions during the 1961-71 period are presented in the Table 2.10.

Table 2.10      Average Regional Growth Rates  
of the Towns and Villages,      1961-1971

region	growth rate (%)
Northern Ontario Region	0.8
Eastern Ontario Region	11.7
Lake Ontario Region	12.4
Georgian Bay Region	21.0
Central Ontario Region	26.6
Midwestern Ontario Region	17.7
Niagara Region	22.0
Lake Erie Region	9.4
Lake St. Clair Region	16.4

The towns and villages in Northern Ontario Region had the lowest growth rate. This region had not a single high growth place but 5 declining places, forming 62 percent of the total places in the region. This region heavily depended on mining operations and forest-based industries. Manufacturing and services were not as advanced as in other Ontario regions. Besides, this area is far away from Ontario's prospering major economic growth centers, and it



has harsher climatic conditions than other regions. All these were the possible reasons for the very slow population growth in this region.

Central Ontario Region and Niagara Region were the two regions which had the highest population growth rates among the towns and villages. This was Ontario's most urbanized and economically developed area. Along the coast of Lake Ontario from Oshawa to St. Catharines is a string of closely spaced cities with its focus on the Toronto metropolitan region. Toronto, Canada's largest industrial and commercial metropolis, strongly influenced the area. Also, Toronto had a large population growth rate during the 1960s. Hamilton was Canada's third leading manufacturing city, with a strong regional influence in this area. Both the cities and the surrounding places had large population growth rates during the 1960s. There were no declining places in this area. Central Ontario Region had 6 high growth places, forming 60 percent of all the studied towns and villages in the region. The towns and villages in Central Ontario Region were within close proximity to Toronto metropolis. Toronto provided a great job market and various kinds of services for these surrounding places so that they were able to grow quickly. The Niagara Region also had 4 high growth places, accounting for 33 percent of the total in the region, all of them being very close to the large cities of the region.

The towns and villages in Georgian Bay Region had

population growth rates only lower than those in the Central Ontario Region and the Niagara Region, although Georgian Bay Region was mainly an agricultural region. This region had 2 declining places, only 7 percent of the total places, and 8 high growth places, 28 percent of all the places in the region. Some of the high growth places in the region (located in the southern part) were not far away from Toronto, and their fast growth was due to the same reasons that influenced growth of the places in the Central Ontario Region. The fast growth of some places in the northern part of the region may be due to some special reasons, such as increasing development of tourism and recreational facilities for the Central Ontario's urban dwellers. Another example is Tiverton in Bruce County. It had experienced very fast growth since 1961. This growth is attributable almost entirely to one factor, the location of the Bruce Nuclear Power Development at nearby Douglas Point (Dahms, 1986).

The average growth rates of the towns and villages in all the other regions were lower than 20 percent during the 1960s. These regions were: Lake St. Clair Region, Midwestern Ontario Region, Lake Ontario Region, Eastern Ontario Region, and Lake Erie Region.

The Table 2.11 shows the number and percentage of the declining places or of the high growth places in the few regions. For example, Lake St. Clair Region had 3 declining

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Table 2.11 Comparison of Some Regions 1961-1971

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	No. of D place	%	No. of H place	%
Lake St. Clair Region	3	13	4	17
Midwestern Ontario Region	1	6	4	25
Lake Ontario Region	5	20	4	16
Eastern Ontario Region	4	19	5	24
Lake Erie Region	2	11	1	5

---

places, which accounted for 13 percent of all the places in the Lake St. Clair Region. This region had 4 high growth places, accounting for 17 percent of all the places in the region. From the table we can see that Lake Ontario Region and Eastern Ontario Region had the highest percentage of declining places; and Midwestern Ontario Region and Eastern Ontario Region had the highest percentage of high growth places. Eastern Ontario Region had a large percentage of both declining places and high growth places. This region generally did not have a strong industrial-commercial base so that most of the towns and villages in the region grew slowly. However, the places close to Ottawa had an advantage to grow fast. Three of the five high growth places in this region were around the Ottawa area. In Midwestern Ontario Region the high growth places were close to Waterloo-Kitchener and Toronto. In Lake St. Clair Region

there were high growth places close to Windsor, such as St. Clair Beach and Tecumseh. Thus, nearness to a large city seems to be a reason for the high growth places in these regions. For the declining places, they were usually close to small size cities and not in the major transportation routes.

#### (5) Occupational Types

To examine the relationship between economic structure of the towns and villages and their population growth, the places were classified according to their occupational structures. Since some people may live in a place but work in another place, the occupational data of a place may not reflect its economic structure very well. Hodge and Qadeer (1983) found from the 1971 data that in Canada's towns and villages about 70 percent of the labour force was employed locally. When most of the people worked locally, the occupational data roughly reflected the economic structure of the places.

In 1961, the places with population less than 1,000 did not have occupational data, so they were excluded from the study. The occupations were divided into 7 groups: 1 craftsmen and production process; 2 farmers; 3 miners and other primary workers; 4 transportation and communication; 5 service and recreation; 6 sales; 7 other occupations (including managerial, clerical, and professional and

technical)). These divisions were based on the 1961 census classification. Group 1 is roughly equivalent to blue collar sector in the earlier correlation and regression analyses, Group 2 and 3 are in the primary sector, and other groups are all in the service sector.

The classification of those places was based on Tarver's (1972) method. The percentages of the 7 occupational groups were calculated for each place, then the occupational percentages in all the places were averaged for every occupational group. If a place had a percentage in one occupational group larger than the average value of all the places for that occupational group plus one standard deviation, this place was classified as belonging to this occupational group. For example, in Delhi, the percentage of farmers group was larger than the average percentage of all the places plus one standard deviation, thus Delhi would be classified into farmers place. In Lively, the percentage of miners group was larger than the average of all the places plus one standard deviation, thus Lively would belong to a miners place. If a place had a percentage for all the occupational groups not larger than the average for all the places plus one standard deviation, or if it had more than one occupational group whose percentage was larger than the averages of all the places plus one standard deviations (very few such cases were encountered), this place would be considered to be a diversified place.

Based on the above classification, the relationship between the occupational types and population growth rates in the towns and villages with population over 1,000 is shown in Table 2.12.

Table 2.12 Occupational Types of the Towns and Villages 6  
1961-1971

occupation. No. of types	average . places	average . city size.	average . size	average . distance	average . growth rate
I	12	55,558	3,521	21.15	18.0 %
II	11	71,304	2,875	28.03	10.2 %
III	5	67,502	2,809	16.50	5.9 %
IV	3	33,811	1,708	16.86	23.2 %
V	9	34,145	3,228	24.19	11.8 %
VI	14	69,543	2,916	29.55	16.8 %
VII	11	249,352	1,826	23.01	25.7 %
VIII	48	92,209	3,221	27.23	14.6 %

Among the eight occupational types, Type III had the slowest population growth. This type of places specialized

6) Type I is craftsmen and production process; Type II is farmers; Type III is miners and other primary workers; Type IV is transportation and communication; Type V is service and recreation; Type VI is sales; Type VII is Other occupations (including managerial, clerical, and professional and technical); and Type VIII is diversified.

5

in mining, fishing, and lumbering. These places included: Coniston, Copper Cliff, Levack, Lively, and Wheatley. Except for Wheatley, all the places are in Northern Ontario Region. These places had relatively large average city size and short distance, which provided favorable conditions to growth. However, these places had the slowest average growth rate, which reflected the influence of their occupational type and regional location.

Farmers places (Type II) had the second lowest average growth rate. These places were: Casselman, Delhi, Harrow, Kingsville, Norwich, Leamington, Strathroy, Tavistock, Thornbury, Waterford, and Wellington. Most of the places are in Lake Erie Region and Lake St. Clair Region. The large average distance value in this type indicates that these places were relatively far away from the nearest cities.

✓

Craftsmen and production process places (Type I) had the largest average size. Its population growth rate was in the middle of all the occupational types. These places were mainly in Midwestern Ontario Region, Central Ontario Region, and Niagara Region. They included: Acton, Bowmanville, Bridgeport, Cardinal, Deseront, Dunnville, Hespeler, Iroquois, Listowell, New Hamburg, Paris, and St. Clair Beach.

Transportation and communication type (Type IV) had only three places: Capreol, Victoria Harbour, and Port

McNicoll. This type of place had fast growth. Capreol is in Northern Region, and the other two places are on the northern coast of Georgian Bay.

Service and recreation places (Type V) had faster growth than farmers places. These places were: Alliston, Brighton, Chalk River, Crystal Beach, Exeter, Gravenhurst, Penetangurshen, Petawawa, and Port Stanley. The places in this type and in the Type VI (sales places) were dispersed sparsely, and were not concentrated in one or two regions.

Sales places (Type VI) acted as central places for the rural area and were generally not located close to the cities, Table 2.12 shows that this type of place had the largest distance value. Their growth rate was in the middle, lower than that of craftsmen and production process places but higher than those of primary type places. These places included: Athens, Caledonia, Eganville, Gananoque, Markdale, Mitchell, Napanee, Norwood, Orangeville, Simcoe, Stirling, Stouffville, Tweed, and Winchest.

'Other occupations' places (Type VII) were the fastest growth places. The 'other occupations' included managerial, clerical, and professional and technical services. The average size of the nearest city in this type was much larger than other types, which indicates that these places were generally located close to a large city. These places were: Chippawa, Elora, Fenelon, Fonthill, Kemptville, Madoc, Richmond, Stittsville, Waterdown, Watford, and Woodbridge.



There were many places which did not meet the specialization criteria adopted earlier, and belonged to the diversified group of places (Type VIII), their average population growth rate was in the middle of all the occupational types.

Table 2.13 shows the distribution of the declining places and the high growth places according to the occupational types.

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Table 2.13 The Declining Places and the High Growth Places  
in the Occupational Types, 1961-71  
.....

occupational types	No. of all place	No. of D place	(%)	No. of H place	(%)
I	12	1	8.3	3	25.0
II	11	1	9.1	0	0.0
III	5	2	40.0	0	0.0
IV	3	0	0.0	1	33.3
V	9	1	11.1	2	22.2
VI	14	2	14.3	3	21.4
VII	11	0	0.0	5	45.5
VIII	48	7	14.6	12	25.0

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It can be seen that both 'Other occupations' type places (Type VII) and Transportation and communication type

places (Type IV) did not have any declining places, while Miners and other primary type places (Type III) had a large portion of declining places. Farmers type places (Type II) and Miners and other primary type places did not have any high growth places, while 25 percent of Craftsmen and production process type places were high growth places, and 45.5 percent of 'other occupations' type places were high growth places. From the above picture, we can see the population growth rates of the towns and villages had some relationship with their occupational structures.

In short, if the occupational structure of a place was strongly primary occupations oriented, this place was very likely to decline and was unlikely to become a high growth place. On the contrary, if the occupational structure of a place was dominated by some special service occupations, such as the occupations in the Type VII, this place had a very good chance to be a high growth place. The places of this type were probably the residential satellites of large cities, because the occupations reflected the urban-oriented occupations. Transportation and communication type places formed another group of fast growth places, and their growth may be supported by the development of the transportation functions. The average growth rates in all the other occupational types did not differ much from each other and these types included most of the places. This may be an important reason as to why the occupational structure can

not explain the population growth in the towns and villages well in the regression model.

In this chapter, the role of the five influencing factors in explaining the population changes in the towns and villages during the 1961-71 decade was examined. Two urban shadow variables, the nearest city size and the distance, were found to be important factors. Some regional variables, such as Northern Ontario Region, Georgian Bay Region, and Central Ontario Region, were also found to be important. Size factor and occupational factor were not important in the correlation and regression analyses. These findings are basically the same as those in Brozowski's (1971) study for the two earlier decades. The discussion of the influencing factors in the later part of this chapter further confirmed that the towns and villages near a large city were more likely to grow faster than near a small city, and all the declining places were found to be located close to small cities. The distance effect on the growth of the towns and village was evident when the places located within 10 km of the nearest city were found to have much faster growth than the places beyond 10 km. The influence of the distance on the places beyond 10 km was not strong in relation to their growth. The large size towns and villages were found to be less likely to decline than the small size places, but the size factor was not important to the place's

growth. The regional location of the towns and villages was found to have an effect on their population growth. The places in some regions such as Central Ontario Region had much faster growth than those in some other regions. While Central Ontario Region and Niagara Region did not have any declining places, most of the places in Northern Ontario Region were declining places. The towns and villages specialized in certain types of occupations such as 'other occupations' type and transportation and communication type were found to have much faster growth than others, and the places in some occupational types such as mining & other primary type and farmers type grew much slower than others. This indicates that the occupations did influence the population change in the towns and villages.

### Chapter III

#### Population Change in Ontario Towns and Villages, 1971-1981

The rate of population growth in Ontario continued to decrease during the 1971-81 period following the slow-down of the population growth during the previous decade. The average population growth rate in Ontario during the 1971-81 decade declined to only one-half of that during the 1961-71 decade, from 23.5 percent dropped to 12.0 percent, which was the lowest growth rate since 1941. The natural population increase rate declined further. ~~The~~ The average annual natural population increase rate in 1971, 1976, and 1981 was 0.8 percent, while that in 1961, 1966, and 1971 was 1.26 percent. The number of immigrants to Ontario during the decade also decreased by five percent compared with the previous decade. For the internal migration, there were 10.6 percent more out-migrants than in-migrants in Ontario during the 1971-81 decade, while during the previous decade in-migrants were 29.3 percent more than out-migrants (Ontario Statistics, 1984).

Contrasted with the decade of 1961-1971, Canada's economic development slowed down during the decade of 1971-1981. The energy crisis during this decade

destabilized the economy of the whole Western world. Meanwhile, Canada faced increasing competition on the world market. Within Canada, while Alberta experienced an economic boom during the 1971-81 decade, Ontario's economic position declined. In terms of key indices of the economy, such as growth of GNP per capita, investment, and manufacturing shipments, Ontario's growth rate was relatively low, and the rate of employment increase was also below the national average (Sitwell and Serfried, 1984).

Although the average rate of Ontario's population growth decreased greatly during the 1971-1981 period compared with the previous decade, the average population rate of Ontario towns and villages did not decrease as much. The gap in population growth rates between the provincial average and the towns and villages became much narrower during the 1971-81 decade than during the previous decades (see Table 1.1).

#### Correlation and Stepwise Regression Analyses

With the rate of population growth in the Ontario towns and villages during the 1971-81 period as the dependent variable and the same five influencing factors (15 variables) as in the previous chapter as the independent variables, the correlation and stepwise regression analyses were run to reveal the relationship of the population growth

rate and the influencing factors during the 1971-81 decade. The results of the correlation analysis are shown in the following table (Table 3.1).

Table 3.1 Correlation between the Population Change and the Influencing Factors, 1971-1981

Variable	r
1 size of nearest city	0.10610
2 percent employed in service sector	0.08917
3 percent employed in blue collar sector	-0.06224
4 percent employed in primary sector	-0.07552
5 size of towns and villages	0.10099
6 distance to nearest city	-0.12249
7 Northern Ontario Region	-0.19863 *
8 Eastern Ontario Region	-0.16088
9 Lake Ontario Region	-0.15604
10 Georgian Bay Region	0.21845 *
11 Central Ontario Region	0.35008 *
12 Midwestern Ontario Region	0.03492
13 Niagara Region	-0.09619
14 Lake Erie Region	-0.00538
15 Lake St. Clair Region	-0.00092

\* significant at 0.05 level

The correlation matrix reveals the importance of the regional variables during this decade. Five regional variables had the highest absolute  $r$  values among all the independent variables. Central Ontario Region, Georgian Bay Region and Northern Ontario Region were significant at the 0.05 level. The city size factor was less important during this decade, while it was much more important than other variables during the previous decade.

Comparing the results with those in the last chapter, some findings are presented (see Table 3.2)

From the table we can find that the city size variable maintained positive correlation with the rates of the population growth during the two decades. The distance variable maintained a negative relationship with the rates of the population growth during this period. The positive  $r$  value of the city size variable indicates that the towns and villages near a larger city tended to grow faster and this was the case in these two decades. However, the relationship of the variable with the rate of population growth changed from significant during the 1961-71 period to insignificant during the 1971-81 decade, as the  $r$  value of this variable dropped greatly in the latter decade, showing a major decrease in the importance of the city size factor in explaining population growth. The negative  $r$  value of the distance variable indicated that the places located nearer the city still tended to grow faster, which had not



changed since 1941.

Table 3.2 Comparison of the Correlation Analyses,  
1960s and 1970s

variable	r	
	1961-1971	1971-1981
city size	0.264 *	0.106
service	0.055	0.089
blue collar	0.048	-0.062
primary	-0.076	-0.076
size	-0.026	0.101
distance	-0.122	-0.122
Northern Ontario	-0.185 *	-0.199 *
Eastern Ontario	-0.092	-0.161
Lake Ontario	-0.072	-0.156
Georgian Bay	0.138	0.218 *
Central Ontario	0.163 *	0.350 *
Midwestern Ontario	0.039	0.035
Niagara	0.100	-0.096
Lake Erie	-0.120	-0.005
Lake St. Clair	0.019	0.001

\* significant at 0.05 level

The  $r$  value of the size factor was larger during the 1971-81 decade than during the 1961-71 period, its positive  $r$  value shows that the larger size places tended to grow faster or decline slower. The three occupational variables had small  $r$  values, indicating that the relationship between the population growth of the towns and villages and the occupational factor was weak. The service variable was positively related to the population growth during the two decades, and the primary variable was negatively related to the population growth, while the blue collar variable changed from positive to negative during the two decades.

The regional variables as a whole increased their importance in explaining the population growth during the 1971-81 period as compared with the 1961-71 period. Northern Ontario Region had a significant relationship with the population growth during the two decades. The towns and villages in this region tended to grow slowly or decline. Central Ontario Region and Georgian Bay Region greatly increased their  $r$  values during the 1971-81 decade. The towns and villages in these regions experienced faster growth than before. The four regions which had negative relationships with the population growth during the 1961-71 period still kept the negative relationship during the 1971-81 decade, and the four regions which had a positive relationship with the population growth still had the positive relationship, with an intensification of the

positive relationship in the Central and the Georgian Bay Regions. Only Niagara Region changed the sign of the  $r$  value. This region had fast growth during the 1961-71 period but its growth greatly slowed down during the later decade.

The stepwise analysis removed the possible intercorrelation between the variables and showed that there were seven variables among the fifteen independent variables which met the 0.15 significant level set by the computer and entered into the stepwise regression model (Table 3.3). The seven variables totally explained 31.9 percent of the dependent variable, this result was much better than that during the 1961-71 period.

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Table 3.3 Stepwise Summary Table 1961-1971

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variable entered	partial RSQ	model RSQ
Central Ontario	0.1226	0.1226
Georgian Bay	0.0695	0.1921
city size	0.0512	0.2433
Northern Ontario	0.0227	0.2660
distance	0.0195	0.2855
Eastern Ontario	0.0187	0.3042
Niagara	0.0152	0.3194

---

After changing the significant level from 0.15 to 1.00, all the independent variables were able to enter into the regression model. The results of this stepwise regression analysis are compared with those of the previous decade in Table 3.4.

The fifteen independent variables totally explained 33.3 percent of the dependent variable during the 1971-81 period, while the same variables accounted for only 17.3 percent of the dependent variable during the previous decade. The increase in the total RSQ value was mainly due to an increase in the importance of some regional variables. Although the Ontario towns and villages generally had lower rates of population growth during 1971-81 compared with 1961-71, the growth rates of the places in Central Ontario Region were greatly increased during the 1971-81 period. There were no places declining and most of the places in this region had fast growth. Thus, Central Ontario became the most important variable in explaining the population change of the towns and villages.

Georgian Bay Region was another region which had faster growth in the towns and villages during the 1971-81 decade than during the previous decade. The southern part of this region was also strongly influenced by Toronto as those in the Central Ontario Region. Northern Ontario Region was an important variable during the two decades of 1961-71 and 1971-81. This region experienced a decline in most of

Table 3.4 Comparison of the Stepwise Analyses  
1961-71 and 1971-81

1961-71		1971-81	
variable	RSQ	variable	RSQ
1 city size	0.070	1 Central Ontario	0.123
2 Northern Ontario	0.101	2 Georgian Bay	0.192
3 distance	0.118	3 city size	0.243
4 Georgian Bay	0.138	4 Northern Ontario	0.266
5 Lake Erie	0.148	5 distance	0.285
6 Eastern Ontario	0.158	6 Eastern Ontario	0.304
7 Lake Ontario	0.166	7 Niagara	0.319
8 Central Ontario	0.168	8 Lake Erie	0.325
9 size	0.169	9 size	0.328
10 service	0.171	10 blue collar	0.329
11 Niagara	0.172	11 service	0.330
12 blue collar	0.172	12 primary	0.332
13 primary	0.172	13 Midwestern	0.333
14 Midwestern	0.173	14 Lake Ontario	0.333
15 Lake St. Clair	0.173	15 Lake St. Clair	0.333

its towns and villages, its average growth rate was lower during 1971-81 than before. Because the population decline

was common in the towns and villages in this region, Northern Ontario Region got larger RSQ value than most of the other regional variables.

The city size and the distance were still two relatively important factors during the 1971-81 decade as before. Although as some regional variables became important, the importance of the two urban shadow factors decreased. Since the transportation system continuously improved through time, it was reasonable to see a decrease in importance of the distance factor. The decreasing importance of the city size factor was not easy to explain. It may be due to the dispersal of several industrial, commercial, and service establishments originally concentrated in the large cities to the smaller cities, or the population shift from the large cities to the smaller cities during the 1970s (see Phillips and Brunn, 1978; and Hodge and Qadeer, 1983). The increased economic strength and population in the smaller cities would increase their influence on the surrounding areas, thus resulting in narrowing the gap between the large cities and the smaller cities in terms of their influence on the towns and villages. If this was the case, it would justify the declining importance of the city size factor.

As in the previous decade, the size and the occupational factors were still not important in explaining the population changes. The size variable only accounted

for 0.3 percent of the dependent variable during the 1971-81 decade, and the three occupational variables only explained 0.4 percent of the dependent variable.

#### High Population Growth Places and Declining Places

The definition of the high growth places and the declining places during the 1971-1981 period was the same as the previous period. During the period of 1971-81, there were 163 towns and villages in the study, with an average population growth rate of 13.3 percent, which was lower than the average of 15.7 percent during the 1961-71 decade. There were more declining towns and villages during this decade (36 compare to 23 in the previous decade), and a few very high growth places during the 1971-81 decade had even higher growth rates than their counterparts during the 1961-71 decade. For example, there were seven places with growth rates higher than 50 percent during the 1971-81 decade compared with five places during the 1961-71 decade, and the former also had higher average growth rate than the latter. This indicates that the population growth in the towns and villages had greater variance during the 1971-81 period than before. Some towns and villages sped up in their growth, but other towns and villages continued to grow slowly or even decline.

The 36 places with declining population growth rates

were taken as the "declining places", and the 32 places whose population growth rates ranked in the upper quartile of the non-declining places were considered as "high growth places". Both the declining places and the high growth places together accounted for 41 percent of the total towns and villages. The geographical distribution of the two kinds of places is shown in the Figure 3.1. The distribution pattern of the two kinds of places was basically the same as that in the previous decade. The high growth places were concentrated around the Toronto region and the declining places were mostly scattered in the northern area and the peripheral areas of the province.

#### Influencing factors

##### (1) City size

The city size factor in the earlier regression analysis showed that this factor was important. The following table further reveals the relationship of the city size factor with the population growth in the towns and villages.

The table shows a generally positive relationship between the city size and the population growth rate of the towns and villages according to the city size category. As the city size became larger, the growth rates of the towns and villages also increased. There were 124 towns and villages whose nearest city sizes ranked from 10,000-100,000



DISTRIBUTION OF THE HIGH GROWTH PLACES AND THE DECLINING PLACES  
(1971 - 1981)

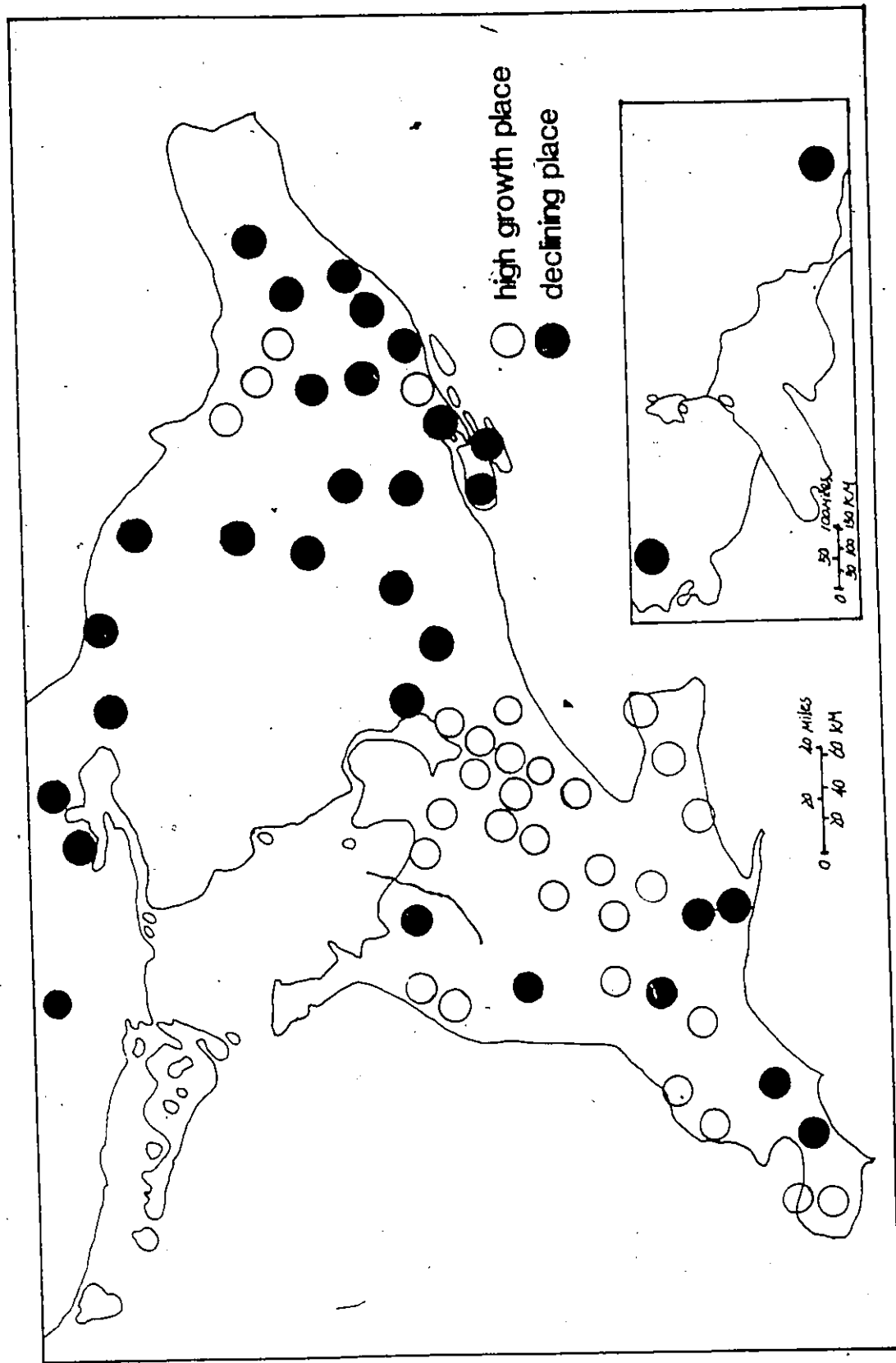


Figure 3.1

Table 3.5 City Size and Growth Rate, 1971-1981

city size	10,000-100,000	100,000-1,000,000	>1,000,000
growth rate (%)	8.7	17.9	62.3
No. of all places	124	30	9
No. of D places	34	2	0
(% of all places)	27.4	6.7	0.0
No. of H places	15	9	8
(% of all places)	12.1	30.0	88.9

(first city size group), these places had the smallest average growth rate. The 34 declining places in this group accounted for 27.4 percent of all the 124 places, while there were less high growth places (only 15 places) in this group. The percentage of the high growth places in the city size groups increased fast with the increase of the city size, which indicates that the towns and villages close to large cities had much better chance to grow than those close to small cities. Almost all the declining places were concentrated around the small size cities, which was also the same as during the previous decade. Only 2 declining places were in the second city size group (100,000-1,000,000), and there were no declining places in the third city size group (larger than 1,000,000). Even within the small city size group, the declining places were still more

likely to be located near the smaller cities.. This can be shown by dividing the first city size group in the same way as in the previous chapter (see Table 3.6).

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Table 3.6 City Size and Declining Places, 1971-81

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city size	10,000-20,000	20,000-40,000	40,000-100,000
No. of all places	48	37	38
No. of D places	15	11	8
(% of all places)	31.3	29.7	21.1

---

## (2) Size of the towns and villages

Larger size places generally tended to grow faster, although the earlier regression analysis had shown that the relationship between the size and the population growth was weak. The positive relationship of the size of the places and the population growth rates of the places was clear in the Table 3.7.

Among the 38 small places with size less than 1,000, ten of them were the declining places, forming 26.3 percent of all the 38 places. For the 62 medium size places, the percentage of the declining places decreased to 24.2 percent and it decreased further to 17.5 percent in the 63 large size places. This pattern was the same as that during the previous decade, indicating that the larger

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Table 3.7    Size and Population Growth Rate    1971-81

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size	< 1,000	1,000-2,500	2,500-10,000
growth rate (%)	6.7	13.2	17.1
No. of all places	38	62	63
No. of D places	10	15	11
(% of all places)	26.3	24.2	17.5
No. of H places	4	15	13
(% of all places)	10.5	24.2	20.6

---

places were still less likely to decline than the smaller places. As to the distribution of the high growth places, the medium size places still had the largest percentage of the high growth places as in the previous decade. The medium size towns and villages had an equal chance to become the declining and high growth places during this decade, while the small size places were more likely to become declining places rather than high growth places, and the large size places had better chance to become high growth places than declining places.

### (3) Distance to the nearest city

The earlier stepwise regression analysis had indicated that the distance factor was an important factor in explaining the population growth in the towns and villages.

Table 3.8 shows that the average growth rates of the towns and villages generally decreased as the distance to the nearest city became longer. The largest difference in the growth rates was still in the distance of 10 km as was the case during the previous decade. The towns and villages located within 10 km had much higher average population growth rates than the places further beyond, and the average growth rates of the towns and villages located in the distance bracket from 10 km and over was declining only slightly.

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Table 3.8 Distance and Population Growth Rate, 1971-81

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distance (km)	<10	10-20	20-30	30-40	>40
growth rate (%)	21.2	15.2	13.0	11.8	11.0
No. of all places	12	35	40	47	29
No. of D places	3	6	5	15	7
(% of all places)	25.0	17.1	12.5	31.9	24.1
No. of H places	4	6	9	10	3
(% of all places)	33.3	17.1	22.5	21.3	10.3

---

The distribution of the declining places and the high growth places was less regular during this decade than the previous decade. The towns and villages located within 10 km of the nearest city had a large proportion of the declining places. This is quite different from the previous

decade when the proportion of the declining places in the distance group was very small. The proportion of the declining places in the second distance group (10 - 20 km) was also larger during this decade than during the previous decade. Meanwhile, the proportion of the high growth places in both the above distance groups (0 - 10 km and 10-20 km) were lower than those during the previous decade. This reflects a decrease in the importance of the distance factor in the growth of the towns and villages, the places very close to the nearest city were less favoured by in-migrants than before.

However, comparing the percentage of the declining places with that of the high growth places in the Table 3.8 during the 1971-81 decade, we can find that the former was lower than the latter in the first three distance groups, indicating that the towns and villages located within 30 km were more likely to grow rather than decline. On the contrary, the percentage of the declining places in the last two distance groups was larger than the percentage of the high growth places, which indicates that the places located beyond 30 km were more likely to be on the decline and less likely to become the high growth places. This pattern reveals that a place closer to the nearest city still had more chance to grow faster than a place farther away.

#### (4) Regions

The nine Ontario economic regions during the 1971-81 decade are the same regions as in the previous chapter. The average population growth rates of the towns and villages in the regions are shown in the Table 3.9.

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Table 3.9 Economic Regions and their Population Growth

Economic Regions	Average Growth Rate (%)	
	1961-71	1971-81
Northern Ontario Region	0.8	-4.5
Eastern Ontario Region	11.7	5.3
Lake Ontario Region	12.4	5.8
Georgian Bay Region	21.0	22.8
Central Ontario Region	26.6	41.5
Midwestern Ontario Region	17.7	15.7
Niagara Region	22.0	6.1
Lake Erie Region	9.4	12.6
Lake St. Clair Region	16.4	13.5

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The table reveals the great difference of the population growth rates in the economic regions. The towns and villages in Central Ontario Region had very high average growth rate of 41.5 percent during 1971-81, the highest

among all the regions. The average growth rate in Georgian Bay was the second highest among the regions, although it was only about one-half of that in Central Ontario Region. Northern Ontario Region was the only region whose towns and villages had average negative growth rate, Eastern Ontario Region, Lake Ontario Region, and Niagara Region were the three slow growth regions with an average growth rate of less than 10 percent. The other three regions, Midwestern Ontario Region, Lake St. Clair Region, and Lake Erie Region, had their average growth rates higher than 10 percent.

Northern Ontario Region had 6 declining places, 75 percent of all the places in the region. This region had no high growth places. Compared with the previous decade, the average growth rate in the towns and villages in Northern Ontario Region during 1971-1981 period decreased from 0.8 percent to -4.5 percent -- the only region with a negative rate. Meanwhile, this region had more declining places than before. Its peripherally economic location and relatively harsh climatic conditions made it less attractive to migrants than other regions.

Eastern Ontario Region, Lake Ontario Region and Niagara Region were three slow growth regions. During the decade of 1961-1971, Niagara Region was a relatively fast growth region, with an average growth rate only next to Central Ontario Region. But during the 1971-81 decade, its population growth rate dropped considerably and it had no



high growth places but had two declining places, which accounted for 18.2 percent of all the places in the region. In Eastern Ontario Region there were three high growth places, all of them being around Ottawa area, accounting for 13.0 percent of the total places in the region; this region had 11 declining places scattered all over the region, forming 47.8 percent of the total places in the region. Lake Ontario Region had only one high growth place, 4.2 percent of the total; it had 6 declining places, 25 percent of the total places in the region.

Midwestern Ontario Region, Lake Erie Region, and Lake St. Clair Region had average growth rates between 10 percent and 20 percent and with a relatively small percentage of the high growth and declining places. The high growth places in these regions were usually close to large cities, for example, Erin was close to Toronto, Elora and New Hamburg were close to Waterloo-Kitchener, Lucan and Dutton were close to London, and St. Clair Beach and Essex were close to Windsor.

Georgian Bay Region kept a relatively high growth rate during the two decades of 1961-71 and 1971-81. While most of the regions had lower average growth rates in 1971-81 than in 1961-71, Georgian Bay Region had a higher growth rate in the latter decade. This Region had 9 high growth places, 30 percent of its total places, and 4 declining places, 13.3 percent of the total places. Among the 9 high

growth places, 5 of them were close to Toronto, and 2 of them, Southampton and Port Elgin, were near a provincial park and the Bruce Nuclear Power Station which employed many workers. The 4 declining places were located in the far north of the region, far away from the large cities.

Central Ontario was the only region which did not have any declining places during the decade of 1971-81. It had 7 high growth places, accounting for 70 percent of the total places in the region. The average growth rate of this region was much higher than those of other regions, and also higher than the previous decade. Almost all the places in Central Ontario were within commuting distance to Toronto, except Beaverton, Sutton, and Port Perry which were a little far away. Central Ontario as a region has been most strongly influenced by the Toronto metropolitan complex. Its high average growth rate reflects the fact that the towns and villages around Toronto were in a much more favourable condition to growth than the places located in some other areas.

#### (5) Occupational types

The method used here is the same as in the previous chapter. The occupational data of the towns and villages in 1971 included all the towns and villages in the study, while in the 1961 data, the villages with population of less than 1,000 were excluded. The occupations of the places were

divided into 7 groups as in the previous chapter, namely: 1. manufacturing (including processing, production & repairing, and construction, similar to the Group 1 in the 1961 data which included craftsmen and production process); 2. farmers; 3. miners & other primary workers; 4. transportation; 5. service; 6. sales; 7. 'other occupations' (including managerial, teaching, health, social & art, clerical and technic.). These divisions were based on the 1971 census data.

The towns and villages were classified into 8 occupational types based on the above 7 occupational groups according to the method used in Chapter II. Table 3.10 shows the relationship between the occupational types and the average population growth rates of the towns and villages.

The influence of the occupations on the population growth rate in 1971-81 was similar to that in 1961-71. The transportation type and the 'other occupations' type had the highest population growth rates during both the decades, while the miners & other primary type had the lowest population growth rate. The farmers type, the service type, and the sales type had relatively low population growth rates in the two decades.

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 Table 3.10 Occupational Types of the Towns and Villages 7  
 1971-81  
 .....

type	No. of place	city size	size	distance	growth rate
.....	.....	.....	.....	.....	.....
I	19	49,012	1,863	25.99	8.6 %
II	13	73,188	1,608	30.34	7.3 %
III	9	62,005	2,598	23.77	2.0 %
IV	6	80,608	1,077	27.13	27.1 %
V	12	82,376	2,485	25.39	9.5 %
VI	21	64,369	2,316	33.29	7.9 %
VII	19	473,380	2,795	28.26	25.4 %
VIII	64	61,317	3,533	27.26	13.6 %

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Miners & other primary type (Type III) had the lowest population growth rate. These places included: Cache Bay, Capreol, Coniston, Copper Cliff, Erieau, Kingsville, Levack, Lively, and Wheatley. Six of the nine places were in Northern Ontario Region, which was a declining region during this decade.

Farmers type (Type II) had the second lowest population

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7. Type I: manufacturing; Type II: farmers;  
 Type III: miners & other primary workers;  
 Type IV: transportation; Type V: service;  
 Type VI: sales; Type VII: 'other occupations';  
 Type VIII: diversified.

growth rate as in the previous decade. Like in the previous decade, the place in this type also had large distance value which indicates that they were relatively far away from the nearest cities. These places were: Ailsa Craig, Bloomfield, Bothwell<sup>sp</sup>, Delhi, Drayton, Harrow, Niagara, Port Burwell, Shallow Lake, Stouffville, Vienne, Wardsville, and Waterford. Among those places, about half of them were located in the Lake Erie Region, a region of relatively low population growth among the southwest Ontario regions.

Sales type (Type VI) had only a slightly larger average population growth rate than the farmers type. Compared with other occupational types, this type of places was located farthest away from the nearest cities during the two decades from 1961 to 1981. This type included: Arthur, Campbellford, Casselman, Coldwater, Eganville, Exeter, Finch, Hagersville, Hastings, Madoc, Port Rowan, Port Stanley, Simcoe, Southampton, Stayner, Stirling, Thamesville, Tillsonbury, Victoria Harbour, Wasaga Beach, and Wiarton. These places were mainly distributed in Lake Erie Region, Georgian Bay region, Eastern Ontario Region, and Lake Ontario Region.

Manufacturing type (Type I) and service type (Type V) places' population growth rates were in the middle of all the occupational types. These two types had similar population growth rates and were almost at the same average distance from a city. Manufacturing type places were mainly

located in Georgian Bay Region and Midwestern Ontario Region, namely: Acton, Ayr, Bath, Belle River, Bonfield, Cardinal, Colborne, Deseronto, Durham, Frandford, Hespeler, Iroquois, Milverton, New Hambury, Oil Springs, Omemee, Springfield, Wellington, and Woodville. Service type of places were more evenly distributed in Ontario regions (except for Northern Ontario Region) although the number of these places were fewer: Brighton, Cayuga, Chalk River, Chatsworth, Chippawa, Dutton, Gravenhurst, Highgate, Lancaster, Lucan, Petawawa, and Tilbury.

As in the previous decade, - transportation type (Type IV) had the least number of places but maintained high population growth rate. In fact this type of place had the highest average population growth rate among all the types during the 1971-81 decade. This may reflect the rapid development of transportation in the last one or two decades. These places included: Beeton, Maxville, Norwood, Port McNicoll, Tara, and Wyoming.

The 'other occupations' type (Type VII) kept its two apparent characteristics of the previous decade: very large average city size and fast population growth. The occupations of this type had close relations with the nearby large city's functions. This places of this type were mainly located in Central Ontario Region and in southern part of Georgian Bay Region in proximity to Toronto, and in Easter Ontario Region, close to Ottawa. These places were:

Almonte, Bolton, Carleton, Elmvale, Embro, Flesherton, Kemptville, Newmarket, Powassan, Richmond, Ridgetown, Rockland, Stittsville, St. Clair Beach, Tottenham, Uxbridge, Waterdown, Winchester, and Woodbridge.

Many places did not meet the specialization criteria and were classified as diversified places (Type VIII). The average growth rate of this type of place was lower than that of Type IV and Type VII places, but higher than the growth rates in the other types of places.

Table 3.11 Occupations and High Growth (H) or Declining (D) Places, 1971-81

occupational type	No. of all place	No. of D place	(%)	No. of H place	(%)
I	19	4	21.1	2	10.5
II	13	4	30.8	0	0.0
III	8	5	62.5	0	0.0
IV	6	1	16.7	3	50.0
V	12	3	25.0	2	16.7
VI	21	8	38.1	3	14.3
VII	19	1	5.3	8	42.1
VIII	65	10	16.1	14	17.7

The Table 3.11 shows that all the occupation types had

declining places but two of the eight types did not have high growth places. The largest percentage of declining places occurred in the Type III (miners & other primary type), where 5 declining places accounted for 62.5 percent of all the places in the occupational group. Type VI (sales type) and Type II (farmers type) also had large proportion of the declining places, followed by Type V (service type) and Type I (manufacturing type). Type VII (other occupations type) had a very small percentage of the declining places. For the high growth places, Type IV (transportation type) and Type VII ('other occupations' type) had very large proportion of the high growth places, followed by the Type VII (diversified type), while Type II (farmers type) and Type III (miners & other primary) did not have any high growth places. The above pattern was very close to that of the previous decade. The very different percentage values in different occupational types shows that the occupational types did have an effect on the population growth rate.

As in the previous chapter, two urban shadow variables, the nearest city size and the distance, and some regional variables, such as Central Ontario Region, Georgian Bay Region, and Northern Ontario Region, were found to be important influencing factors in this analysis. The two influencing factors, the size of the places and the



occupational variables, which were found not important in the earlier period and in Brozowski's study, were still not important in this period. One of the two urban shadow variables, either the city size or the distance, was always the most important variable and another was the second or the third important variable during the previous three decades, but the relative importance of the urban shadow factor had decreased during the 1971-81 decade. Some regional variables became the most important during this decade. The table in this chapter shows that while most of the regions slowed down in their growth, the two fast growth regions in the previous decade, the Central Ontario Region and the Georgian Bay Region, had even faster growth than before. As during the previous decade, the declining places were still concentrated around the small cities and the places with a large city as the nearest city had a tendency to become high growth places during the 1971-81 decade. The towns and villages located closer to the nearest city were still more likely to grow faster than those places farther away during this decade, although the places very close to the nearest city became more likely to decline or experience slow growth than before. The size factor was found to be positively related to the growth of the places, the larger size places generally had the high average population growth rate during this decade, in spite of the fact that the size factor was still not important in

the correlation and regression analyses. The gap of the average growth rates among the different occupational types became even larger during the 1971-81 decade than the previous decade. The transportation type places grew even faster than the previous decade and the 'other occupational' type places maintained their fast growth during the 1971-81 decade, while the slow growth types of places such as mining & other primary type and farmer type grew at a even slower rate during the later decade.

## Chapter IV

### Population Change in Ontario Towns and Villages during the 1971-1981 decade

#### - An Analysis Based on a Modification of the Influencing Factors and Some New Factors

The influencing factors in the previous chapter explained a total of 33.3 percent of the population growth of the study towns and villages during the decade of 1971-81, indicating that the chosen influencing factors were not very satisfactory in terms of explaining the population growth. In order to improve the explanation, in this chapter some factors used in the two earlier chapters were modified and some new factors were added. The modified factors included a new measure of the urban shadow effect and a wider selection of the occupational variables, while the new factors consisted of unemployment rate and income levels. The size and regional factors used in the earlier chapters remained unchanged in this chapter.

#### Urban shadow

The two factors of distance and city size were used to measure the influence of cities on their surrounding towns

and villages. The larger city was supposed to have a positive influence on the growth of its surrounding towns and villages, and a town or village nearer the city was supposed to grow faster than a town or village farther away. Brozowski's study and the analysis presented in the previous chapters proved that this was generally the case, but the relationship between city size and distance and population growth rate was not very significant during our study period. The shortcoming of this approach was that it only considered one city's influence on one town or one village. In many cases this could not truly reflect the actual influence of the cities on a town or a village because a town or a village may be under the influence of several nearby cities at the same time. In some cases the nearest city approach could be misleading. For example, around Toronto there were a few smaller cities, and some towns and villages in this area were very close to them, and were, thus, assigned small city size value. Two places which were located at the same distance to Toronto might be assigned two quite different city size values, one nearer Toronto might get the city size value of over 2 million, while the other place might get city size value of only 10 thousand if its nearest city happened to be a city of 10 thousand. In actual life such a town or village may be as much, if not more strongly, influenced by Toronto as by the nearest small city. Hence, to ignore Toronto would be denying a reality

that is more overpowering in its impact on towns and villages within its hinterland.

To resolve this problem, there is a need to take into account the influence of all the nearby cities on the towns and villages. The literature review and the study in the previous chapters have indicated that city size was usually positively related to the population growth of the towns and villages and the distance to the city was generally negatively related to the population growth of the towns and villages. Thus, the urban shadow to the towns and villages was determined as function of city size divided by distance ( $P/D$ ). This  $P/D$  value only reflected the influence of one city. To include several cities together, the  $P/D$  was changed to  $(P_i/D_i)$ . This value included all the nearby cities within the maximum distance of 30 miles, a distance considered to be a convenient or optimal commuting distance, while any cities located farther than 30 miles from the study places were excluded.

So the urban shadow was defined as  $(P_i/D_i)$ . To determine the distance effect in the urban shadow factor, three equations were applied and compared. These three equations were:  $u_1 = \sqrt{P_i/D_i^{0.5}}$ ,  $u_2 = (P_i/D_i)$ , and  $u_3 = (P_i/D_i^2)$ . The small value of the exponent of the distance implies that the change along the distance is very gradual and smooth, while the large value of the exponent represents that the change along the distance is steep.

Three regression analyses were run with the population growth rate of 1971-81 as the dependent variable and the three urban shadow values  $u_1$ ,  $u_2$ ,  $u_3$  as the independent variables. The results were:

RSQ value was 0.3549 with the  $u_1$  as the dependent variable

RSQ value was 0.2075 with the  $u_2$  as the dependent variable

RSQ value was 0.0915 with the  $u_3$  as the dependent variable.

The  $u_3$  had much smaller RSQ value than the  $u_1$  and  $u_2$ , indicating that the change in the growth rates of the towns and villages along the distance to their nearby cities was not steep and great. The fact that the  $u_1$  had the best RSQ value reveals that the change in the growth rates of the places along the distance was gradual, and the difference in the population growth rates between the places close to the city and far away from the city was small. Since  $u_1$  had the largest RSQ value, it was chosen to represent the urban shadow value.

2  
The use of the urban shadow as an influencing factor improved the explanation of the population growth in the towns and villages. By using the method applied in the previous chapter, with the population growth rate of 1971-81 as the dependent variable and the distance and the nearest city size as the independent variables, the regression analysis was run which showed that these two variables combined to explain only 7.1 percent of the dependent variable (the RSQ value of the distance was

0.0195 and the RSQ value of the city size was 0.0512). This RSQ value was much smaller than the RSQ values derived by applying all the three urban shadow formulas ( $u_1$ ,  $u_2$ , and  $u_3$ ).

It turned out that most of the towns and villages had more than one city located within 50 km of distance. Among the total of 163 towns and villages under study, only 50 places or 30.5 percent of all the places had one city located within 50 km distance. More than half of the towns and villages (51.2 percent) had two to four nearby cities (cities within 50 km distance of the towns and villages). About 20 percent of the towns and villages had five or more nearby cities, including four towns with ten or more nearby cities. Generally, the more nearby cities a place had, the larger urban shadow value the place would acquire. Thus, the number of nearby cities within close proximity of a town or a village itself had a significant relationship with the rate of the population growth in the towns and villages. Using the population growth rate of 1971-1981 as the dependent variable and taking the number of nearby cities as the independent variable, the regression analysis showed that the independent variable was able to explain the dependent variable by 20.5 percent. A conclusion, thus, can be drawn that a place with more nearby cities tended to grow faster than a place with less nearby cities.

An example shows that the urban shadow factor used here can avoid some problems in the nearest city and distance approach in the previous chapters. Table 4.1 shows that the four towns (Acton, Milton, Newmarket, and Waterdown) in Central Ontario Region with ten or more nearby cities had very large urban shadow values (hereafter all the urban shadow value would use the value of u1 to represent it because u1 had the best correlation with the population growth rate); but the four towns did not have very large nearest city size value because some of the four towns' nearest cities were small size cities.

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Table 4.1 Comparison of Nearest City Size and Urban Shadow  
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	nearest city size	urban shadow	growth rate (%)
the 4 towns	28,685	475,665	39.3
all places	90,675	73,412	13.3

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The table above shows that the average size of the nearest city in the four towns (28,685) was much smaller than the average size of the nearest city in all the towns and villages (90,675). However, in terms of the urban shadow value, the situation was just reversed. The average urban shadow value of the four towns (477,665) was much higher than the average urban shadow value of all the places (73,412). The average rate of the population growth in the



four towns (39.3 percent) was also much higher than that of all the places (13.3 percent). The four towns had both large urban shadow values and high population growth rates, but they did not have large values for the size of the nearest city. From this example we can conclude reasonably that the urban shadow approach used in this chapter was able to improve our ability to explain the population growth in the towns and villages in comparison with the nearest city approach applied in the previous chapters.

#### Occupations

The Occupational factor was divided into three groups in the previous studies: the percent of primary employment in the total employment, the percent of blue collar employment, and the percent of service employment. They entered stepwise regression analyses as the three independent variables. The RSQ values of the three independent variables were always very small in the regression analyses. This influencing factor was not important in Brozowski's study, and was also not important in the analyses in the previous chapters. The reason for this poor performance of the occupational factor might be that the occupational divisions were too generalized. For example; the primary group of places had two main different types of places: the places specialized in agriculture and

the places specialized in mining. These two kinds of places had different distributions: the former being mainly located in southern Ontario and the latter in northern Ontario. These two kinds of places might have different population growth patterns. The service group included a diverse range of occupations. The places with high percentage of occupations in managerial or technical jobs might have different population pattern from the places with a high percentage of occupations in sales or personal services. When these occupations were combined together, the high growth-related occupations might be offset by the low growth-related occupations, resulting in no apparent growth patterns in the occupations. Therefore, the three occupational divisions were further divided in this chapter to see if the new divisions could improve the explanation of the population growth in the towns and villages.

The occupations in this chapter were divided into seven groups which included: 1) the percentage of manufacturing employment in the total employment, 2) the percentage of farmers employment, 3) the percentage of miners & other primary occupations employment, 4) the percentage of transportation employment, 5) the percentage of service employment, 6) the percentage of sales employment, and 7) the percentage of 'other occupations' employment. These seven divisions were the same as the seven specialized occupational types in Chapter III which were based on the

1971 Census classification. The occupations in this chapter were divided according to percentage employment in each occupational group as Brozowski did, while in the previous chapters, the towns and villages were classified based on their occupational specialization.

Multiple regression analysis was run with the population growth rate of 1971-1981 as the dependent variable and the seven occupational groups as the independent variables, the result was shown in the following table:

Table 4.2 Regression Analysis with the Seven Occupational Groups, 1971-81

variable	partial RSQ	model RSQ
other occupations	0.0570	0.0570
service	0.0153	0.0723
miners & other primary	0.0171	0.0894
farmers	0.0053	0.0947
transportation	0.0017	0.0964
sales	0.0003	0.0967
manufacturing	0.0001	0.0968

The seven independent variables totally explained about 9.7 percent of the dependent variable. Among the

seven occupational groups, "other occupations" group was the most important, which was significant at 0.05 level, followed by the miners & other primary group and the service group. To reveal the improvement resulting from the use of seven occupational groups instead of three occupational groups, the multiple regression analysis was run with the population growth rate of 1971-81 as the dependent variable and the three occupational groups as the independent variables. The result shows that the three independent variables were able to explain only 1.2 percent of the dependent variable (Table 4.3).

Table 4.3 Regression Analysis with the Three Occupational Groups, 1971-81

variable	partial RSQ	model RSQ
service	0.0080	0.0080
blue collar	0.0021	0.0101
primary	0.0019	0.0120

Comparing the RSQ values for the three groups of occupations with those for the seven groups of occupations, we can find that the seven occupation groups did improve the explanation of the population growth of the towns and villages, the RSQ value increased from 1.2 percent to 9.7

percent. This indicates that the seven occupational divisions can better represent the occupational factor than the three occupational divisions used in the two previous chapters and Brozowski's study.

To reveal the nature of the relationship between the population growth of the towns and villages and the seven occupational groups, correlation analysis was run with growth rate of the places as the dependent variable and the seven occupational variables as the independent variables. The results are shown in the Table 4.4.

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Table 4.4 Correlation between Growth rate  
and Occupations, 1971-81

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variable	r
other occupations	0.23820 *
sales	0.05315
service	-0.15494
transportation	0.00162
farmers	0.06052
miners & other primary	-0.19058 *
manufacturing	-0.06274

---

\* significant at 0.05 level

The table shows that the 'other occupations' group was

positively related to the population growth, that is, a place with the larger percent of people employed in this occupational group would tend to have faster growth. Both the miners & other primary group and the service group had negative  $r$  values, indicating that these two occupational groups were not favoured for the population growth. The study in the previous chapters had shown that the miners & other primary occupational type was mostly related to population decline. The  $r$  values of all the other occupational groups were very small so that they could be ignored.

#### Unemployment rate

A new influencing factor, unemployment rate, was introduced to explain the population growth. Many studies about migration have shown that the search for jobs is a major motive for people's movement. Unemployment rate is a good indicator of a place's job opportunity. If a place has a high unemployment rate, it may not be a good place for the people to move in. The high unemployment rate in a place may also lead some people to move out. Thus, the unemployment rate factor was expected to have significant relationship with the population growth in the towns and villages. A place with higher unemployment rate would be expected to have slower population growth than a place with

lower unemployment rate. Since the unemployment rate factor is relatively unstable over time, this factor used in this study was the average of the unemployment rates for the census of 1971, 1976, and 1981 to represent the unemployment rate for the 1971-81 decade. The correlation and regression analyses with the population growth rate of 1971-81 as the dependent variable and the unemployment rate as the independent variable provided:

$$r = - 0.3193$$

$$RSQ = 0.1019$$

The analyses shows that the unemployment rate factor had significant negative relationship (at 0.05 level) with the population growth rate in the towns and villages, indicating that the places with high unemployment rates did generally have slower population growth. The unemployment rate factor explained 10.2 percent of the dependent variable. Although this result was far from adequate, yet the value of 10.2 percent was larger than those of all the other independent variables except for urban shadow value in this chapter and Central Ontario Region variable in the last chapter.

The average unemployment rate for all the study towns and villages in 1971-81 decade was 6.8 percent. This value was used to divide the places into two groups: the places with the unemployment rates higher than the average and the places with the unemployment rates lower than the average.

Each of the two groups were further divided into two groups to distinguish the "very high" unemployment rate places from the "high" unemployment rate places, and to distinguish the "very low" unemployment rate places from the "low" unemployment places. From the Table 4.5 based on the above divisions, we could find that the average population growth rate increased as the unemployment rate decreased, the urban shadow value also decreased as the unemployment rate decreased.

The table shows that the highest unemployment rate group had the lowest average urban shadow value and the lowest unemployment rate group had the largest average urban shadow value. This indicates that the high unemployment rate places were most likely to be located in less urbanized areas, with a weaker urban influence than the places with lower unemployment rates.

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Table 4.5 Urban Shadow and Growth Rate in the  
Unemployment Rate Groups, 1971-1981

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No. of place	unemployment rate	urban shadow	growth rate
19	very high (>9.3%)	24383	2.2 %
55	high (6.8% - 9.3%)	29347	8.9 %
70	low (4.4% - 6.8%)	83284	15.8 %
19	very low (< 4.4%)	195306	28.8 %

---



The places of the very low unemployment rate group (less than 4.4%) had the highest average population growth. Among these places, only 0.5 percent (one place) belonged to the declining places and 57.9 percent of them were the high growth places (the declining places and the high growth places were defined as in the previous chapters).

For the places in the low unemployment rate (4.4% - 6.8%) group, the rate of the average population growth was lower than that in the very low unemployment rate group, but higher than that in the high unemployment rate places. Among the places of this group, 17.1 percent were declining places, and 20.0 percent were high growth places. Compared with the very low unemployment rate group, this group had more declining places and less high growth places.

For the high unemployment rate group (6.8% - 9.3%), the rate of the average population growth further decreased compared with that in the above three groups. There were 11.3 percent of the high growth places and 24.5 percent of the declining places in this group of the places.

The towns and villages in the very high unemployment rate group (larger than 9.3%) might be viewed as economically depressed places. More than half of the places in this group were the declining places (52.6 percent), their average population growth rate was also the lowest among all the unemployment rate groups. However, there still were 10.5 percent of the places in this group

belonging to the high growth places.

Generally, the population growth rates of the towns and villages varied with the unemployment rates of the places. The places with high unemployment rates were associated with low population growth rates. These places were also more likely to become the declining places than the places with low unemployment rates, while the latter was more likely to become the high growth places.

#### Income

Another new influencing factor, average per capita income of the towns and villages, was included in this study of population change. If the high unemployment rate of a place is considered as a "push" factor to make people move out of the place, the high income of a place is a "pull" factor to attract people to move in. Both unemployment rate and income are economic factors. Their role in people's migration at inter-regional and inter-metropolitan levels has been discussed in many past studies (such as Cordey-Hayes, 1975; and Williams, 1981). The income factor was expected to be positively related to the population growth, that is, a place with higher average income was expected to have faster population growth than a place with lower average income. People were assumed to be most likely to move from low income areas to high income areas. Like the

unemployment rate factor, the income factor was also expected to have significant relationship with the population growth of the towns and villages.

Taking the income factor as an independent variable and the population growth rate of 1971-81 as the dependent variable, we ran the regression analysis and produced the results:

$$r = 0.2833$$

$$RSQ = 0.0802$$

The RSQ value of the income factor was slightly smaller than that of the unemployment rate factor, indicating that the two factors had almost the same importance in terms of explaining the population growth of the towns and villages. Like the unemployment rate factor, the income factor was also not the most satisfactory influencing factor. The positive sign of  $r$  value indicated that higher income was related to higher population growth, a place with higher income would tend to have faster population growth than a place with lower income.

The average income of all the study towns and villages in 1971 was \$4583, and most of the places had income around the average income. Highgate Village in Lake Erie Region had the lowest income at \$3246, and St. Clair Beach in Lake St. Clair had the highest income at \$8718. However, only a few places had the income either higher than \$5500 or lower than \$3500. Large size places generally had higher income

than the small size places. The places with the income below the average income (\$4500) had the average population size of 1,372 (with many places below 1,000), while the places with the income higher than the total average income had the average population size of 2976 (with very few places below 1,000).

Since most of the places had income between \$3500 and \$5500, it was convenient to divide these places into two groups by drawing a line at the total average income of \$4500. Thus, both groups (one was lower than the total average, one was above the total average) each had about 70 towns and villages. The rest of the places were grouped into larger than \$5500 or less than \$3500. The relationship between the income groups and the population growth rate is shown in the following table.

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Table 4.6 Income and Growth Rate, 1971-81

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No. of place	income	growth rate
7	less than \$3500	7.5 %
71	\$3500 - \$4500	8.2 %
74	\$4500 - \$5500	15.6 %
11	larger than \$5500	33.4 %

---

The table shows that the lower income corresponded with the lower population growth rate and the higher income

was related to the higher population growth rate. The growth rates of the two low income groups were close to each other. The lowest income group had no high growth places but 2 declining places which accounted for 28.6 percent of the 7 places in this group. The second group, income lower than total average group, had 11.8 percent of their places belong to the high growth places, but 23.5 percent of the places were the declining places. The places in the third group had higher income than the total average, and these places' average growth was also much faster than the two lower income groups. Among the places in this group, 23.3 percent of them were the high growth places and 21.9 percent were the declining places.

The last group had much higher values in both income and population growth rate. Unlike the first group, in which the places' income was only two or three hundred dollars lower than the income of \$3500, the places in this group had income two or three thousand dollars higher than the income of \$5500. These very high income places had very high population growth, which proved that the high income places did attract in-migrants. Only two places among the very high income group belonged to the declining places, both places were in Northern Ontario Region, which was an overall population declining region. Among the rest of the places in this group, 63.6 percent of them were the high growth places.

### Multiple influencing factors

After the discussion of the influencing factors above, the modified factors and new factors seems to be able to explain the population growth in the towns and villages better than the influencing factors used in the previous chapters. Now the modified and new influencing factors were put together to run the correlation and stepwise regression analysis so that we can observe the degree of improvement in our explanation by using the modified and new influencing factors.

The correlation analysis revealed the relationship between the population growth rate in the towns and villages during the 1971-81 and all the influencing factors. The results are shown in the Table 4.7.

Urban shadow variable had very good correlation with the dependent variable, with a  $r$  value of almost 60 percent. The positive  $r$  value of the urban shadow variable indicates that the towns and villages with larger urban shadow value would have faster population growth during the 1971-81 period. With the large positive  $r$  value, we can confidently say that the cities had the most dominant influence on the population changes of the towns and villages in the cities' surrounding areas. The stronger the urban influence was,

Table 4.7 Correlation Matrix 1971-1981

variable	r
urban shadow	0.59572 *
unemployment rate	-0.31934 *
income	0.28335 *
size	0.13043
miners & other primary	-0.19058 *
transportation	0.00162
farmers	0.06052
other occupations	0.23875 *
service	-0.15494
sales	0.05313
manufacturing	-0.06247
Northern Ontario Region	-0.21980 *
Eastern Ontario Region	0.00000
Lake Ontario Region	-0.14268
Georgian Bay Region	0.21636 *
Central Ontario Region	0.34987 *
Midwestern Ontario Region	-0.09726
Lake Erie Region	-0.00797
Lake St. Clair Region	-0.00203
Niagara Region	0.00000

\* significant at 0.05 level

the faster the growth of the towns and villages would be. Central Ontario Region variable had the second highest  $r$  value. This region had very fast population growth in the towns and villages during the 1971-81 decade due to the dominance of Toronto metropolis and several large growing cities within its close proximity. Unemployment rate variable and income variable were two important variables, their  $r$  values were only lower than that of the Central Ontario Region variable. The negative  $r$  value of the unemployment rate variable suggests that the high unemployment rate would restrict the growth of the towns and villages. The positive  $r$  value of the income variable indicates that the high income places would have faster population growth than the places with lower income.

Besides Central Ontario Region, Northern Ontario Region and Georgian Bay Region also had a strong correlation with the population change. Most of the towns and villages in Georgian Bay had fast growth, but most of the places in Northern Ontario Region had slow growth or decline. That was the reason that these two regional variables had large absolute  $r$  values. Two occupational variables had significant relationship with the population change in the towns and villages, namely, the 'other occupations' and the miners & other primary occupational groups. All the other variables did not have significant relationship with the population change in the towns and villages.



Using stepwise analysis which removed the inter-correlation between the independent variables, we get the following results in the Table 4.8.

The table shows that the independent variables totally explained 52.2 percent of the dependent variable. If the significant level was set at the 0.05, there would be five independent variables in the regression model, namely, urban shadow, Georgian Bay Region, unemployment rate, Lake St. Clair Region, and Northern Ontario Region, which combined to explain 47.7 percent of the dependent variable. If the significant level was set at the 0.15 level, two more independent variables would be added in the model, namely, income and Midwestern Ontario Region, the total RSQ value would increase to 50.1 percent. In chapter III, the fifteen independent variables totally explained 33.3 percent of the same dependent variable. This comparison shows that the modified and the new additional influencing factors had significantly improved the explanation of the population change in the towns and villages.

Urban shadow variable showed its overwhelming importance among all the independent variables. It alone accounted for 35.5 percent of the population growth, which was better than all the fifteen independent variables combined together in the last chapter. In the discussion of urban shadow factor earlier in this chapter, we realized

Table 4.8 Stepwise Summary Table 1971-81

variable	partial RSQ	model RSQ
urban shadow	0.3549	0.3549
Georgian Bay Region	0.0577	0.4126
unemployment rate	0.0289	0.4415
Lake St. Clair Region	0.0201	0.4616
Northern Ontario Region	0.0154	0.4770
income	0.0122	0.4892
Midwestern Ontario Region	0.0121	0.5013
Lake Erie Region	0.0046	0.5059
miners & other primary	0.0027	0.5086
sales	0.0029	0.5115
Central Ontario Region	0.0024	0.5139
Eastern Ontario Region	0.0027	0.5166
transportation	0.0015	0.5185
size	0.0013	0.5194
manufacturing	0.0008	0.5202
service	0.0001	0.5203
farmers	0.0001	0.5204
other occupations	0.0021	0.5224
Niagara Region	0.0000	0.5224

that the distance of a place to its nearby cities was not

very important, the real important factor was how many cities the place was close to, and how large the nearby cities were. So the places which were located nearby large cities or had several nearby cities had much better chance to grow than other places. Toronto area was an example, in that area there were many high growth places and almost no declining places.

Regional factors was also important in explaining the population change in the towns and villages. The importance of Central Ontario Region greatly dropped because it was strongly inter-correlated with the urban shadow factor. Georgian Bay Region showed to be the second important variable in the table. The towns and villages located in Georgian Bay Region, especially in the northern part of the region, were less influenced by the large cities, so this region had less inter-correlation with the urban shadow factor and was able to keep its importance in the regression model. Lake St. Clair Region was not an important variable in the correlation analysis, but it became an important variable in the regression analysis, which was hard to explain. Northern Ontario Region was important in both correlation and regression analyses, and its importance did not decrease much in the stepwise regression analysis because the urban influence in this region was not as strong as in Central Ontario Region.

Unemployment rate factor appeared to be the third

important among all the independent variables, which accounted for 2.9 percent of the dependent variable. In the earlier part of this chapter, the unemployment rate variable was able to explain 10.2 percent of the dependent variable in the single regression analysis. The drop of the RSQ value from 10.2 percent to 2.9 percent implied the unemployment rate factor was highly inter-correlated with the urban shadow factor. This indicated that the places which had the high urban influence were also likely to have low unemployment rate and this kind of places tended to grow faster. However, even if the unemployment rate factor was inter-correlated with the urban shadow factor, it was still an important factor after removing the inter-correlation in the stepwise regression analysis.

Income factor accounted for 1.2 percent, which was significant at the 0.15 level. This factor could explain 8.0 percent in the single regression analysis. The great decrease of the RSQ value from the single regression analysis to the multiple regression analysis implied that the income factor might also be inter-correlated with the urban shadow or the unemployment rate factor. This would imply that the towns and villages with stronger urban influence would have higher income, and the places with low unemployment rate would also have higher income.

The size factor and the occupational factor were not important in the multiple regression model. The size factor

was only able to explain 0.1 percent of the population change. The occupational factor when changed from three occupational groups to seven occupational groups improved the RSQ value of this factor. However, the RSQ value of the seven occupational groups was still small, which together only explained 1.0 percent of the independent variable. The two occupational variables, 'other occupations' and miners & other primary, had significant correlation with the dependent variable in the earlier correlation analysis. Their importance dropped because of the inter-correlation. The miners & other primary variable was inter-correlated with Northern Ontario Region, and the other occupations variable might be inter-correlated with the urban shadow, Central Ontario Region, and Eastern Ontario Region.

In this chapter, the multiple factor correlation and stepwise regression analyses revealed that the urban shadow was a very important and effective influencing factor in explaining the population change in the Ontario towns and villages. The unemployment rate factor, income factor, and some regional factor could be added in the regression model. These seven important independent variables were able to explain 50.1 percent of the population change, a result that was better than all the results obtained from the unmodified influencing factors in the previous chapters or in Brozowski's study. The other twelve independent variables in the regression model were not significant at the 0.15

level, and they totally added only 2.1 percent to the explanation of the model. These twelve independent variables were too ineffective so that their roles in explaining the population change in the towns and villages could be ignored.

## Chapter V

### Summary and Conclusion

The purpose of this thesis was to analyze and interpret the relative importance of selected influencing factors in relation to population changes in Ontario's towns and villages during 1961-81 and to compare with the results derived by Brozowski in a study covering the period of 1941-66. Chapter II and Chapter III in this study updated Brozowski's (1971) study to 1981. The influencing factors chosen by Brozowski had been found to be declining in importance in relation to population changes in the Ontario towns and villages during the three decades from 1941 to 1971, as the total RSQ values of all the influencing factors (15 independent variables) in the stepwise regression analyses were 0.402 in 1941-51, 0.292 in 1951-61, and 0.173 in 1961-71. However, during the 1971-81 decade, the RSQ value of the five influencing factors became large again, rising to 0.333. This was mainly due to the great increase in the RSQ values of some of the regional variables.

Both the two urban shadow variables and the regional variables were important during the study period of Brozowski's study and this study. The two urban shadow

variables, the nearest city size and the distance, were always in the top most position among all the fifteen independent variables in RSQ values during the 1941-71 period, but some regional variables became much more important than the urban shadow variables during the 1971-81 period. The other two influencing factors, the size of the towns and villages and the occupational structure of the towns and villages, were found not to be important during the whole period covered by Brozowski's study and this study.

In Chapter IV a modified version of the urban shadow factor, as well as an occupational factor were adopted for the period of 1971-81, and both the modifications were able to improve the importance of the factors in explaining the population changes in the towns and villages. The modification of the urban shadow factor was particularly important, since it greatly increased the RSQ value of the urban shadow factor. The two new influencing factors, the unemployment rate of the towns and villages and the income of these places, were added in the regression analyses, which were found to be more important than most of the other influencing factors. Both factors were shown to have significant relationship with the population growth rate of the towns and villages in the correlation and stepwise regression analyses.

Besides using correlation and regression analyses, this



thesis utilized simple tabulations to further reveal the relationship between the influencing factors and the population changes in the towns and villages. This method was simple, but it did result in some findings which could not be obtained in correlation and regression analyses. Following is the more detail discussion and summary about the influencing factors.

#### Urban Shadow

The relative importance of the urban shadow factor among the chosen influencing factors was revealed in Brozowski's study and this study. During the three decades of 1941-71, one of the two urban shadow variables, either nearest city size or distance, was always the most important independent variable in the stepwise regression analysis, while the other variable was the second or third in importance among all the fifteen independent variables. During the 1971-81 period, the two urban shadow variables dropped to the third and the fifth position in importance among all the variables.

The importance of the urban shadow factor proved that the population changes in the towns and villages in the study were strongly influenced by the cities. This influence was positively related to the nearest city size and negatively related to the distance. So the towns and

villages near the larger cities had a better opportunity to grow and less chance to decline than those near the smaller cities, and the towns and villages located closer to the nearest city were more likely to grow and less unlikely to decline than those farther away from the nearest cities. The literature review showed that this had been the case for some time in different areas. This study indicates that there was no fundamental change in the role of the two urban shadow variables through time.

However, some change did occur over time. Table 5.1 lists the RSQ values of the urban shadow variables during the four decades, which were derived from the Brozowski's study and the stepwise regression analyses in Chapter II and Chapter III. The change of the RSQ values of the two variables over time can be observed from the table.

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Table 5.1 RSQ Values of the two Urban Shadow Variables

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Distance variable

	1941-51	1951-61	1961-71	1971-81
RSQ	0.117	0.101	0.017	0.019

---

Nearest city size variable

	1941-51	1951-61	1961-71	1971-81
RSQ	0.168	0.039	0.070	0.051

---

The two urban shadow variables generally declined in their importance from the 1941-51 to 1971-81. The great decrease of the RSQ value of the distance factor occurred during the 1961-71, and the big drop of the RSQ value of the nearest city size variable was observed during the 1951-61. The decreasing importance of the distance variable can be reasonably explained. Transportation was not so advanced decades ago, thus proximity to the city was essential to those people who wanted to take advantage of the large job opportunity and the various services in the city during that time. Therefore, the towns and villages located in close proximity to the city and those located in farther distance to the city showed big difference in terms of attracting people, and the commuters from the city mainly lived in the places close to the city. As the transportation improved, the difference between the places near the city and the places farther away from the city became smaller because the latter places had easier access to the city. Since all the towns and villages in the study were within 30 miles (50 km) of the nearest city, the distance factor may become unimportant in the near future if the transportation conditions continue to improve. The nearest city size variable had more variation than the distance variable over time, and it is more difficult to explain the reason for the decreasing importance of this variable over time. A possible reason may be that the population deconcentration

occurred earlier in large cities than in small cities, so the towns and villages near the large cities could grow much faster than the places near the small cities in the earlier time. However, this difference in growth became smaller in the later time when the population deconcentration also took place in the small cities, thus resulting in the decreasing importance of the nearest city size variable.

When the towns and villages were grouped according to their nearest city sizes and the distances to the nearest city, the study showed that the towns and villages with larger average nearest city size had larger average population growth rate during the 1961-81 period. Almost all the declining places were around the small cities (size less than 100,000). Even within the small cities, the smaller cities showed more declining places around them than the larger cities. This was the case during the two decades. On the contrary, towns and villages with large cities as their nearest city had a large proportion of the high growth places. The towns and villages within 10 km of the nearest city showed a major difference from the places beyond the 10 km of the nearest city, the former had much higher average growth rate than the latter. This was particularly evident during the 1961-71 period. The difference in the growth rates between the places within 10 km and beyond 10 km was smaller during the 1971-81 period, but the distribution of the declining places and the high

growth places revealed a difference between the places located within 30 km and beyond 30 km: there were more high growth places than declining places among the towns and villages within 30 km of the nearest city, but there were more declining places than high growth places among those places located beyond 30 km. This change during the two decades may reflect the improvement of the transportation system over time which expanded the distance boundary within which the towns and villages were mostly favoured by the movers from the cities.

The shortcoming of the urban shadow factor above is that it only considered the influence of one city on one town or one village. In fact, a town or a village may be under the influence of several cities at the same time. So in Chapter IV a modified factor was introduced. It took into account all the nearby cities which were within commuting distance of the towns and villages (30 miles). To analyze the role of the distance, three urban shadow formulas,  $(P_i/D_i)$ ,  $(P_i/D_i^{0.5})$ , and  $(P_i/D_i^2)$  were compared. The  $(P_i/D_i^{0.5})$  had the best correlation with the population growth rate, indicating that the influence of the distance from the nearby cities on the population growth of the towns and villages was relatively small. Most of the towns and villages were found to have more than one city located within their commuting distance. The population growth rates of the towns and villages were strongly

correlated with the number of the nearby cities, the RSQ value of which was 20.5 percent during the 1971-81 period, much higher than that of the two unmodified urban shadow variables added together. The number of the nearby cities for towns and villages actually can be viewed as one influencing factor. The more nearby cities a place had, the faster the place would grow. Because more nearby cities usually mean stronger urban influence, we can conclude that the stronger urban influence would lead to faster growth or slower decline in a place.

The modified urban shadow factor considered the number of the nearby cities, the size of the nearby cities, and the distance to these nearby cities. The analysis comparing the unmodified and modified urban shadow factor very much favoured the latter. The RSQ value of the unmodified urban shadow factor during the 1971-81 was 7.1 percent, while the RSQ value of the modified urban shadow factor was 35.5 percent. The modified urban shadow factor is closer to the actual urban influence on its surrounding area than the unmodified urban shadow factor. The large RSQ value of the modified urban shadow factor indicated that the urban influence on the population changes in the towns and villages was still very strong during the 1970-81 decade.

### Regional factor

The Regional factor appeared to be important in Brozowski's study and this study. Among all the influencing factors, the RSQ value of the nine regional variables as a whole was only smaller than that of the two urban shadow variables together during 1941-51, while it was almost the same as that of the urban shadow variables during 1951-61 and 1961-71. It became much larger than that of the urban shadow variables, being the most important variables during the 1971-81 decade. While importance of the urban shadow factor was seen to be declining through the four decades, the importance of the regional factors in explaining the population changes in the towns and villages had increased during the same period except for the 1961-71 period. This can be observed from the following table.

Table 5.2      Comparison of the RSQ Values of the  
Influencing Factors,    1941-81

	1941-51	1951-61	1961-71	1971-81
Regional variables	0.100	0.145	0.083	0.256
Urban shadow variables	0.285	0.140	0.087	0.070
Other variables	0.017	0.007	0.003	0.007

The table shows that the regional variables and the

urban shadow variables. were two important influencing factors, with the former becoming more important through time and the latter being less important over time. The other variables were always not important during the four decades.

The  $r$  values of the regional variables were generally correlated with the average rates of the population growth of the regions, that is, the regions with the larger  $r$  values usually had higher population growth rates than the regions with the smaller  $r$  values. However, the relative importance of the regional variables changed in the stepwise regression analysis compared with that in the correlation analysis. For example, Georgian Bay Region was not an important region among all the regions during the 1951-61 decade if we judged from the  $r$  values of the regional variables. But this region became a very important variable among the regional variables in the stepwise regression analysis during the same time. Central Ontario Region had the second largest absolute  $r$  value among the regional variables during 1961-71, but it was a very unimportant variable in the regression analysis.

The regional variables showed great variation in their RSQ values. Among the nine regional variables, Lake St. Clair Region was the most important variable during 1941-51, which alone explained 5.2 percent of the population changes. Niagara Region and Lake Erie Region were also



important variables during that period. During 1951-61, Central Ontario Region became the most important variable, which alone explained 9.2 percent of the population changes, Georgian Bay Region was the second important variable during the period, while this variable was very unimportant during the previous decade. During the 1961-71 period, Northern Ontario Region became the most important variable, which alone explained 3.1 percent of the population changes. However, this variable had almost zero RSQ values during the two previous decades. Georgian Bay Region was the second important variable, while Central Ontario Region became a very unimportant variable. However, during the 1971-81 decade, Central Ontario Region was the single most important variable, explaining 12.3 percent of the population changes, Georgian Bay Region kept the second important position, and Northern Ontario Region was in third place. Lake St. Clair Region was the most important variable during 1941-51, but this variable had zero RSQ values during the two decades of 1961-71 and 1971-81.

The increasing importance of the regional variables revealed that the regional location of the towns and villages was important in the population changes of these places. However, the great changes in the importance of the individual regional variables were not easy to explain. Lake St. Clair Region, Central Ontario Region, and Northern Ontario Region all experienced the shift from the most

important regional variable during one decade to the very unimportant regional variable during another decade. The other regional variables such as Niagara Region, Georgian Bay Region, and Lake Eire Region had the similar variation.

This study indicates that there were large differences in the population growth of the towns and villages in the nine economic regions during the 1961-81 period. The average growth rates in towns and villages in some regions were several times higher than those in the other regions during the 1961-71 period, and this difference in the population growth further enlarged during the 1971-81 period. As compared with 1961-71, during 1971-81 the fast growth regions such as Central Ontario Region and Georgian Bay Region grew even faster and the slow growth regions such as Northern Ontario Region and Eastern Ontario Region grew even slower. Niagara Region was an exception, which grew fast during the 1960s but greatly slowed down during the 1970s. Central Ontario Region had much higher growth than the other regions during the two decades, the Toronto metropolis in the region should be a reason for this fast population growth. Northern Ontario Region had much lower regional growth than the other regions, this region was the only one which had negative average population growth rate in the towns and villages during the 1971-81.

### Occupational factor

The RSQ values of the occupational variables were usually very small during the four decades. Table 5.3 summarizes the results of the stepwise regression analyses from both Brozowski's study and this study.

Table 5.3 The RSQ values of the Occupational Variables  
1941 - 1981

.....				
primary Variable				
	1941-51	1951-61	1961-71	1971-81
RSQ	0.001	0.004	0.000	0.002
.....				
Blue Collar Variable				
	1941-51	1951-61	1961-71	1971-81
RSQ	0.003	0.000	0.000	0.001
.....				
Service Variable				
	1941-51	1951-61	1961-71	1971-81
RSQ	0.005	0.000	0.002	0.001
-----				

The table shows that none of the variables had the RSQ values larger than 0.5 percent during the four decades, the RSQ values of the occupational variables were among the lowest in all the independent variables. Since the RSQ

values were very small, the relationship between the occupations and the population changes in the towns and villages was hardly established. We may conclude from this fact that the occupational structure of the towns and villages did not have any significant influence on the population changes of these places.

The reason for this lack of importance of the occupational factor could be that the division of the occupations was too broad and crude to bring out their economic strength or weakness that would be reflected in their population changes. So this study modified the occupational factor, dividing the occupations into seven groups instead of three groups. The two regression analyses took the unmodified and modified occupational factors separately as the independent variables and compared the two occupational factors. The results indicated that while the three group occupational factor could explain 1.2 percent of the population change during the 1971-81 period, the seven group occupations could explain 9.7 percent of the same dependent variable. The modified occupational factor did improve the explanation of population changes in the towns and villages. However, in the stepwise analysis with the multiple influencing factors as the independent variables, the modified occupational factor was still very insignificant in explaining the population changes.

Another method was applied in Chapter II and Chapter

III, which yielded more meaningful results. The towns and villages were classified into seven specialized and one diversified occupational types, based on the "average plus one standard deviation" criterion. The average rates of population growth in the towns and villages showed to be quite different among the eight occupational types, with some types having growth rates several times higher than other types. The towns and villages which were classified as specializing in 'other occupations' concentrated on occupations such as managerial, clerical, and technic, and had 25 percent population growth during the 1961-71. This percentage was more than 4 times higher than that of the towns and villages specialized in miners & other primary type of occupations. During 1971-81, the difference between the two types of places further enlarged. The 'other occupations' type of towns and villages were generally located near the large cities. The average size of the nearest city for those towns and villages was also much larger than for other towns and villages. Transportation type of towns and villages also had fast population growth, their average rate of population growth during 1961-71 and 1971-81 being 23 percent and 27 percent respectively. The number of this type of places was the smallest among all the types. These places were generally of small size and were located in less urbanized areas. Georgian Bay Region had the largest percentage of this type of towns and villages.

The rapid growth in these towns and villages may be due to the fast development of transportation in the less developed areas during the recent decades.

The miners & other primary type of towns and villages had much slower population growth than other occupational types of places. Their population growth rate was 6 percent during the 1961-71 and 2 percent during the 1971-81. Most of this type of places were located in the Northern Ontario Region, which was in general a slow population growth region. The difference in the population growth rates in all the other occupational type of towns and villages was relatively small, among them the farmers type of places usually had the lowest population growth and the manufacturing type of towns and villages had the highest population growth during the 1961-81 period.

#### Size factor

The size of the towns and villages was not an important factor to the population change during all the four decades

Table 5.4      The RSQ Values of the Size Variable

	1941-51	1951-61	1961-71	1971-81
RSQ	0.008	0.003	0.001	0.003

of 1941-81. Table 5.4 summarizes the role of size factor in the regression analyses.

The RSQ values of the size factor was so small during the four decades that this factor could not be considered to have any significant relationship with the population changes in the towns and villages. The tabulation method used in this study showed that the medium size places (1,000 - 2,500) had the fastest average growth rate, while the large size places (2,500 - 10,000) had the slowest average population growth rate during the 1961-71 period. However, the larger size places generally had faster population growth than the smaller size places during the 1971-81 period. This may be due to that large places were better able to resist decline than the small places, so when the Ontario population growth greatly slowed down during this decade, the growth rate of the large places declined less than that of the small places. The distribution of the declining places showed that the small size places formed a larger proportion of the declining places than the large size places during the two decades of 1961-71 and 1971-81. The large places usually had a better economic base so that they were less likely to decline if compared with the small places. However, the distribution of the high growth places indicated that the large places did not have the tendency to grow faster than the small places. The growth of a place was due to some reasons other than their size.

### Unemployment rate and Income factors

The past studies have shown that the unemployment rate and the income factors were important in determining inter-regional or inter-metropolitan migration. This thesis used these two factors to test if they were also important in explaining the population changes in the towns and villages. Both factors were found to have significant relationship with the population changes during the study period of the 1971-81. The  $r$  values of the two variables were significant at the 0.05 level in the correlation analysis. In the stepwise regression analysis, these two factors were only less important than the modified urban shadow factor and a few regional variables. The RSQ value of the unemployment rate variable in this analysis was 2.9 percent (the third most important variable in the analysis) and that of the income variable was 1.2 percent, both of which were much better than the size variable and the occupational variables. The unemployment rate variable and the income variable may be inter-correlated with the urban shadow variable and among themselves. The single regression analyses indicated that the unemployment rate variable had RSQ value of 10.2 percent and the income variable had the RSQ value of 8.0 percent. When the towns and villages were grouped according to their unemployment rates and their



income, it was found that the towns and villages with low unemployment rates had much higher average growth rate than those with high unemployment rates, and the places with high income also had much higher average growth rate than those with low income. From this study, a conclusion can be drawn that the unemployment rates of the towns and villages and average income of the towns and villages did have some influence on the population changes in these towns and villages, although this influence was not very strong.

#### Implications of the study

This study attempted to update Brozowski's study so that the influence of some factors on the population changes in the Ontario towns and villages could be examined through a long time period. This study showed that the roles of the influencing factors chosen by Brozowski did not go through any fundamental change during the two decades of 1961-71 and 1971-81 compared with the two previous decades. The urban shadow factor and the regional factor were important during all the four decades, while the size factor and the occupational factor were not important during the study period.

Although all the towns and villages in the study were within commuting distance of the cities, the importance of the urban shadow factor implies that these places would have

different population changes, depending on the degree of the influence of the cities. The fast growth towns and villages were generally around the large cities, and the slow growth and the declining places were usually around the small cities. The towns and villages within commuting distance of a number of cities tended to grow faster than those close to only one city. The towns and villages located farther away from the nearest city usually had slower growth than the places nearer, the towns and villages located within 10 km of the nearest city had a particularly strong tendency of growing. All these findings could be useful for urban and regional planning and further research in this area.

The study showed that the regional factor was an important factor to affect the growth of the towns and villages. The places located in different regions had quite different population growth patterns, since some regions always grew fast while others usually grew slowly. The importance of the regional factor calls for a more in-depth analysis based on a variety of causal factors behind the regional variations in the population changes in the towns and villages. Such studies will be useful for planners to achieve a more balanced economic development and population growth. The insignificance of the size factor and the occupational factor in the correlation and regression analyses during the 1941-81 period has been confirmed in both Brozowski's study and this study. Thus, future

researchers may have confidence to ignore these two factors and look for some new factors to replace them.

The unemployment rate and the income of the towns and villages were found to have a significant influence on the population changes in these places. A place with high unemployment rate means that the people living in this place had difficulty in finding job, which not only reflected the unfavourable economic situation of the place, but also indicated that there might exist some other situations: (1) the place was relatively far away from the cities and other places where job opportunity may exist; (2) the place did not have good transportation links (such as good quality roads) to connect with the nearby cities and other places even if this place was close to those cities and other places; and (3) the whole area (including the place and the nearby cities, towns and villages) within which the people living in the place could conveniently commute had high unemployment rate. Thus, the unemployment rate factor was able to directly or indirectly measure the economic conditions in both the place and its surrounding area as well as the transportation condition of the place. While the data about the local transportation condition and the local areal economic condition were hard to obtain, the unemployment rate of the places could provide a way to indirectly measure them, although only partially.

When a place was a high income place, there could be

three situations. Firstly, if the place was in a high income region, this region would be attractive to the people living in other lower income regions. This situation would help the growth of the place. Secondly, if the high income place was in a low income region, this place would be attractive to the people living in the region. Thirdly, this place might simply be a place which had a concentration of high income people who got their high income from other places. In this situation, this place was likely to have better amenities and infrastructures than the other places in the area since the high income people could better afford to live in a better place than the low income people. As people's income continued to rise, more and more people could afford to move to a better place. Thus, this high income place might have relatively fast population growth, which was not directly due to its high income, but because this place was seen as a better place to live. Therefore, the income factor could reflect both wage level of the towns and villages and the amenities of the places.

The importance of the unemployment rate factor and the income factor means that we could predict the population changes to some degree by examining these two economic factors. The data for these two factors are easy to obtain. While most of the studies using the unemployment rate and the income were done at the inter-regional or inter-metropolitan scale, this thesis indicates that using these

two factors at the towns and villages level may also be worthwhile in the research for the population changes in these places.

#### Further study

Further studies about the population changes in Ontario towns and villages within commuting distance of the cities could choose the same influencing factors and use the correlation and regression analyses in order to examine the changes of the role of the factors over a longer time. If there are further studies based on the framework of this thesis, some suggestions are presented as follows.

The modified urban shadow factor showed a much better correlation with the population changes in the towns and villages than the unmodified urban shadow factor, because the former took into account all the cities within the commuting distance of the towns and villages. However, it is possible to further modify the modified urban shadow factor. It would be better if the distance could be classified into different categories according to the quality of the road or highway and the traffic flow conditions, because the same distance is not the same to the people if one distance is measured along the major highway while another distance is measured along the local rural roads. The different coefficient could be assigned to each

distance category, then the distance multiplies the coefficient to form the modified distance. This modified distance could replace the unmodified distance and enter the urban shadow formula to produce a new urban shadow factor.

Size factor may be excluded from any future study because this factor was never identified to be important during all the four decades of 1941-81. Size factor might be important in the earlier times, because a larger place meant larger job market and more goods and services provided. However, when people became quite mobile, they no longer depended on the local job or goods market. The situation of the nearby cities which provided jobs and various services became much more important. So it is advisable to drop the size factor and add some factors which reflect the situation of the nearby cities.

The unemployment rates of the nearby cities may be considered as a meaningful influencing factor. Since many people live in the towns and villages and work in the nearby cities, the unemployment rates of the nearby cities may influence the people living in the towns and villages and change the population in these places. Another factor, the rates of the population growth in the nearby cities, may be taken as an influencing factor. If the cities have high population growth rates, the increasing problems in housing, transportation, and environment in the cities may result in more people moving out to the surrounding towns and

villages. If the high growth rate of a city persists over time, it can be an index of economic strength of the city and thus would be reflected in the strength of the towns and villages within the commuter's zone.

The percentage of employment in the occupational sector did not have good correlation with the population changes in the towns and villages in the whole study period of the 1941-81. The modified occupational variables still had only small  $r$  and  $RSQ$  values. Since all the towns and villages in the study are within commuting distance of the cities and under the influence of the cities, the occupational structure of the places may not be able to well reflect their economic strength and weakness. This is the case especially for those places which function as residential places for the nearby cities. Thus, it may be better for the future study to look for the occupational (or industrial) structure in nearby cities or in a large area such as a county or a township (since people also commute between towns and villages) as the economic base of the towns and villages instead of taking the occupational structure of the places as the influencing factor, which had been found to be insignificant in explaining the population growth in both Brozowski's study and this study.

The regression analyses produced some residual places and these places were not included in this study. However, a careful examination of the residual places may reveal some

new influencing factors, thus enabling us to improve the explanation for the population changes in the towns and villages. A further study could focus on the residual places to closely examine the actual situation of these places. This thesis also determined high growth and declining places but did not give adequate analysis on them. A more analytical study about these two kinds of places may be needed in order to find out the reasons which cause the particularly high or low growth in the towns and villages. Such a study could be done by the future researchers.

It may be better to limit the study to one region or a smaller area instead of the whole Ontario province. This study showed that the regional location of the towns and villages was important to their growth. However, the reasons for the regional importance have not been revealed in this study. Besides, within one region some towns and villages grew ~~very~~ fast, while others declined. The reasons for the growth or decline of the individual town and village have also not been revealed in this study. In the macro-level study, it is hard to identify the real causes of the population changes for the many towns and villages. If the study is limited to a small area, it would be possible to make detailed investigations based on fewer towns and villages. In that case, the researchers can make field surveys with appropriate questionnaires to obtain relevant and more accurate information. Combined with the census



data, the researchers will be in a much better position to reveal the real causes of the population changes in the towns and villages.

## APPENDIX

### List of the Towns and Villages in the Study

Acton	Kingsville
Ailsa Craig	Lakefield
Alexandria	Lancaster
Alliston	Levack
Almonte	Listowel
Amherstburg	Lively
Arthur	Lucan
Athens	Madoc
Aylmer	Markdale
Ayr	Maxville
Bath	Meaford
Beachburg	Midland
Beaverton	Milton
Beeton	Milverton
Belle River	Mitchell
Blenheim	Morrisburg
Bloomfield	Napanee
Bobcaygeon	New Hamburg
Bolton	Newcastle
Bonfield	Newmarket
Bothwell	Niagara
Bowmanville	Norwich
Bradford	Norwood
Bridgeport	Oil Springs
Brighton	Omeme
Cache Bay	Orangeville
Caledonia	Paris
Campbellford	Penetanguish
Capreol	Petawawa
Cardinal	Petrolia
Carleton Place	Picton
Casselman	Port Burwell
Qayuga	Port Elgin
Chalk River	Port Hope

Chatsworth	Port McNicol
Chesley	Port Perry
Chippawa	Port Rowan
Cobden	Port Stanley
Colborne	Powassan
Coldwater	Prescott
Coniston	Richmond
Copper Cliff	Ridgetown
Courtright	Rockland
Creemore	Seaforth
Crystal Beach	Shallow Lake
Delhi	Simcoe
Deseronto	Southampton
Drayton	Springfield
Dresden	Stayner
Dunnville	Stirling
Durham	Stittsville
Dutton	Stouffville
Eganville	Strathroy
Elmira	Sturgeon Fal
Elmvale	Sturgeon Poi
Elora	St. Clair Be
Embro	St. Mary's
Erie Beach	Sutton
Erieau	Tara
Erin	Tavistock
Essex	Tecumseh
Exeter	Thamesville
Fenelon Falls	Thornbury
Fergus	Tilbury
Finch	Tillsonbury
Flesherton	Tottenham
Fonthill	Tront Creek
Forest	Tweed
Frankford	Uxbridge
Gananoque	Victoria Har
Gravenhurst	Vienna
Hagersville	Wardsville
Harrow	Wasaga Beach
Hastings	Waterdown
Havelock	Waterford
Hepworth	Watford
Hespeler	Wellington
Highgate	Wheatley
Ingersoll	Wiarton
Iroquois	Winchester
Jarvis	Woodbridge
Keewatin	Woodville
Kemptville	Wyoming

## BIBLIOGRAPHY

- Anderson, Theodore R. and Jane Collier. 1956. "Metropolitan Dominance and the Rural Hinterland." Rural Sociology 21:152-157
- Ballard, Patricia L. and Glenn V. Fuguitt. 1985. "The Changing Small Town Settlement Structure in the United States, 1900-1980." Rural Sociology 50:99-113
- Barnard, J.R. and A.C. Krautmann. 1988. "Population Growth among U.S. Regions and Metropolitan Areas: A Test for Causality" Journal of Regional Science 28:103-118
- Beale, Calvin L. and Glenn V. Fuguitt. 1978. "The New Pattern of Nonmetropolitan Population Change." Social Demography, ed. by Karl E. Taeuber, Larry L. Bumpass. and James A. Sweet, Academic Press. New York, USA.
- Beale, Calvin L. 1982. "The Population Turnaround in Rural and Small Town America." Policy Studies Review 2:43-54
- Blanco, C. 1963. "The Determinants of Interstate Population Movement" Journal of Regional Science 5:77-84
- Blanco, C. 1964. "Prospective Unemployment and Interstate Population Movement" Review of Economics and Statistics 46:221-222
- Brozowski, R. 1971. Population Changes in Ontario Towns and Villages, 1941-1966 Master Thesis, Department of Geography, University of Windsor
- Brunner, Edmund deS. 1951. "Village Growth 1940-50." Rural Sociology 16:111-118
- Brunner, Edmund deS. 1952. "The Small Village 1940-1950." Rural Sociology 17:127-131

- Butler, J.E. and G.V. Fuguitt. 1970. "Small Town Population Change and Distance From Larger Towns: A Replication of Hassinger's study" Rural Sociology 35:397-409
- Camu, P., E.P. Weeks, and Z.W. Sametz. 1964. Economic Geography of Canada MacMillan of Canada, Toronto, Canada
- Cebula, R.J. and R.K. Vedder. 1973. "A Note on Migration, Economic Opportunity, and the Quality of Life" Journal of Regional Science 13:205-211
- Clark, W.A.V. 1982. "Recent Research on Migration and Mobility: A Review and Interpretation" Progress in Planning 18:2-56
- Cordey-Hayes, M. 1975. "Migration and the Dynamics of Multiregional Population System" Environment and Planning A 7:793-814
- Courchene, T.J. 1970. "Interprovincial Migration and Economic Adjustment" Canadian Journal of Economics 3:550-576
- Dahms, F.A. 1986. "Diversity, Complexity, and Change: Characteristics of Some Ontario Towns and Villages" The Canadian Geographer 30:158-166
- Davanzo, J. 1978. "Does Unemployment Affect Migration? - Evidence from Micro Data" Review of Economics and Statistics 60:504-514
- Duncan, O.D. and A.J. Reiss. 1956. Social Characteristics of Urban and Rural Community, 1950 Social Sciences Research Council, New York: John Wiley and Sons Inc.
- Fuguitt, G.V. 1964. "Growing and Declining Villages in Wisconsin, 1950-1960" Wisconsin Population No. 2 Population Series, Department of Rural Sociology, University of Wisconsin.
- Fuguitt, Glenn V. 1965. "The Growth and Decline of Small Towns as Probability Process." American Sociological Review 30:403-411
- Fuguitt, Glenn V. and James J. Zuiches. 1975. "Residential Preferences and Population Distribution." Demography 12:491-504

Fuguitt, Glenn V. and Nora Ann Deeley. 1966. "Retail Service Patterns and Small Town Population Change: A Replication of Hassinger's Study." Rural Sociology 34:53-63

Fuguitt, Glenn V. and Paul R. Voss. 1979. Growth and Change in Rural America the Urban Land Institute, Washington, D.C., USA.

Gobbs, Jack P. 1963. "The Evolution of Population Concentration." Economic Geography 39:119-129

Hart J.F. and N.E. Salisbury. 1965. "Population Change in Middle Western Villages: A Statistical Approach." Annals of American Association Geographers 55:140-160

Hassinger, Edward. 1957. "The Relationship of Retail-Service Patterns to Trade-Center Population Change." Rural Sociology 22:235-240

Hodge, G. 1965. "The Prediction of Trade Center Viability in the Great Plains." Regional Science Association, Paper 15:87-115

Hodge, Gerald and Mohammad A Gadeer. 1983. Towns and Villages in Canada Butterworths, Toronto, Canada

Johansen, H. E., and G. V. Fuguitt. 1979. "Population Growth and Retail Decline: Conflicting Effects of Urban Accessibility in American Villages." Rural Sociology 44:24-38

Johansen, Harley E. and Glenn V. Fuguitt. 1984. The Changing Rural Village in America Cambridge, Massachusetts, USA.

Johnston, R.J. 1969. "Population Changes in Australian Small Towns, 1961-1966." Rural Sociology 34:213-218

Joseph, A.E., P.D. Keddie and B. Smit. 1988. "Unravelling the Population Turnaround in Rural Canada" Canadian Geographer 32:17-30

Lewis, G.J. 1982. Human Migration London: Croom Helm

- Lichter, Daniel T., Gleen V. Fuguitt, and Tim B. Heaton. 1985. "Components of Nonmetropolitan Population Change: The Contribution of Rural Areas." Rural Sociology 50:88-98
- Lowry, N. and E.T. Jacobson, 1941. "Recent Changes in Farm Trade Centres of Minnesota" Rural Sociology 6:99-106
- Martin, W.T. 1957. "Ecological Change in Satellite Rural Areas" American Sociological Review 22:173-183
- Mayo, Selz C. 1947. "Two Population Characteristics of County-Seat Towns in North Carolina." Rural Sociology 12:423-426
- Morrill, Richard L. 1979. "Stages in Patterns of Population Concentration and Dispersion." Professional Geographer 31:55-65
- Morrill, Richard L. 1980. "The Spread of Change in Metropolitan and Nonmetropolitan Growth in the United States, 1940-1976." Urban Geography 1:118-129
- Murdock, S. H., B. Parpia, S. Hwang, and R. R. Hamm. 1984. "The Relative Effects of Economic and Noneconomic Factors on Age-Specific Migration, 1960-1980." Rural Sociology 49:309-318
- Northam, R.M. 1963. "Declining Urban Centres in the United States: 1940-1960" Annals of the Association of American Geographers 53:50-57
- Phillips, Phillip D. and Stanley D. Brunn. 1978. "Slow Growth: A New Epoch of American Metropolitan Evolution." Geographical Review 68:274-292
- Porndexter, John R. and William B. Clifford. 1983. "Components of Sustenance Organization and Nonmetropolitan Population Change: The 1970s." Rural Sociology 48:421-435
- Rabianski, J. 1971. "Real Earnings and Human Migration" Journal of Human Resources 6:185-192
- Ratcliffe, S.C. 1942. "Size As a Factor in Population Changes of Incorporated Hamlets and Villages, 1930-1940." Rural Sociology 7:318-328

- Robinson, Warren C. 1965. "Changes in the Rural Population of the United States by Metropolitan and Nonmetropolitan Status, 1900-1960." Rural Sociology 30:166-183
- Roger, A. 1967. "A Regression Analysis of Interregional Migration in California" Review of Economics and Statistics 49:262-267
- Shaw, R. 1985. Intermetropolitan Migration in Canada: Changing Determinants over Three Decades Ottawa: Statistics Canada.
- Sitwell, O.F.G. and N.R.M. Serfried. 1984. The Regional Structure of the Canadian Economy Toronto: Methuen.
- Sommers, P.M. 1973. "Analysis of Net Interstate Migration" Southern Economic Journal 40:193-201
- Stabler, J. C. 1987. "Non-metropolitan Population Growth and the Evolution of Rural Service Centres in the Canadian Prairie Region." Regional Studies 21:43-53
- Tarver, James D. and Calvin L. Beale. 1968. "Population Trends of Southern Nonmetropolitan Towns, 1950 to 1960." Rural Sociology 33:19-29
- Tarver, James D. 1972. "Pattern of Population Change Among Southern Nonmetropolitan Towns, 1950-1970." Rural Sociology 37:53-71
- Williams, J.D. 1981. "The Nonchanging Determinants of Nonmetropolitan Migration" Rural Sociology 46:183-202
1975. Ontario Statistics Ministry of Treasury and Economics, Toronto.
1984. Ontario Statistics Ministry of Treasury and Economics, Toronto.



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